

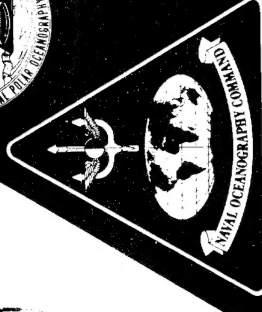
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EASTERN—WESTERN
ARCTIC SEA ICE ANALYSIS
1992

PREPARED BY
NAVAL POLAR OCEANOGRAPHY CENTER
SUITLAND, MD

PREPARED UNDER AUTHORITY OF
COMMANDER, NAVAL OCEANOGRAPHY COMMAND
STENNIS SPACE CENTER, MS 39529-5000

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FOREWORD

The U.S. Navy has a long and eventful history of polar exploration from Robert E. Peary in the Arctic to Richard E. Byrd in the Antarctic. In recent years the strategic importance and expanded research pursuits in these areas have resulted in greater national and international requirements for environmental information. Since 1976, the National Oceanic and Atmospheric Administration (NOAA) and the Navy have worked together at the Joint Ice Center (JIC) in Suitland, Maryland. By combining the Navy's experience in observing and recording sea-ice data, and NOAA's expertise in satellite data collection and interpretation, the JIC has been able to keep pace with that demand in both polar regions.

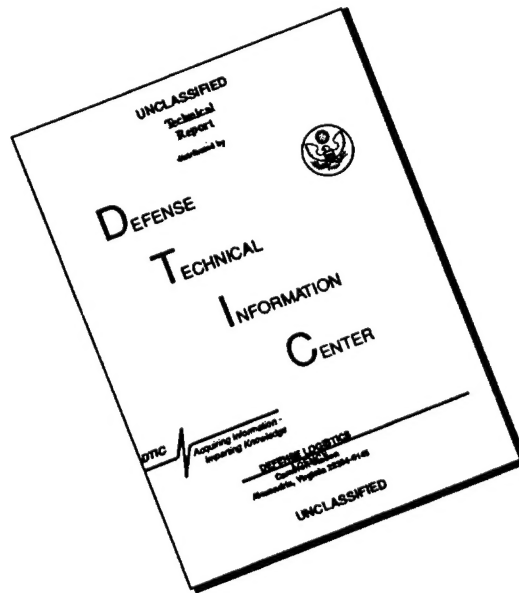
This publication is the 19th edition of the Arctic sea-ice atlases prepared by the JIC. The atlas contains weekly charts depicting Northern Hemisphere and Great Lakes ice conditions and extent. The significant use of high resolution satellite imagery, combined with valuable ice reconnaissance data from various sources, has greatly improved the accuracy of these analyses.

The purpose of this atlas is to provide the user with reliable weekly hemispheric ice analyses. Both Navy and NOAA personnel with considerable experience in sea-ice analysis prepare the analyses. The following procedures have been developed to ensure the quality of the products:

- a. Conventional shore station, ship, and aerial reconnaissance observations are plotted and evaluated.
- b. Satellite data from different sensors is compared and analyzed for ice information content. Table 1, located on the inside back cover, summarizes the data availability for 1992.
- c. A final product results from a and b. However, where insufficient data is available, an estimated boundary will be depicted. Meteorological data and computer generated ice drift vectors are used to determine the estimated ice position.

NAVY/NOAA Joint Ice Center
Naval Polar Oceanography Center
4301 Suitland Road
Washington, DC 20395-5180

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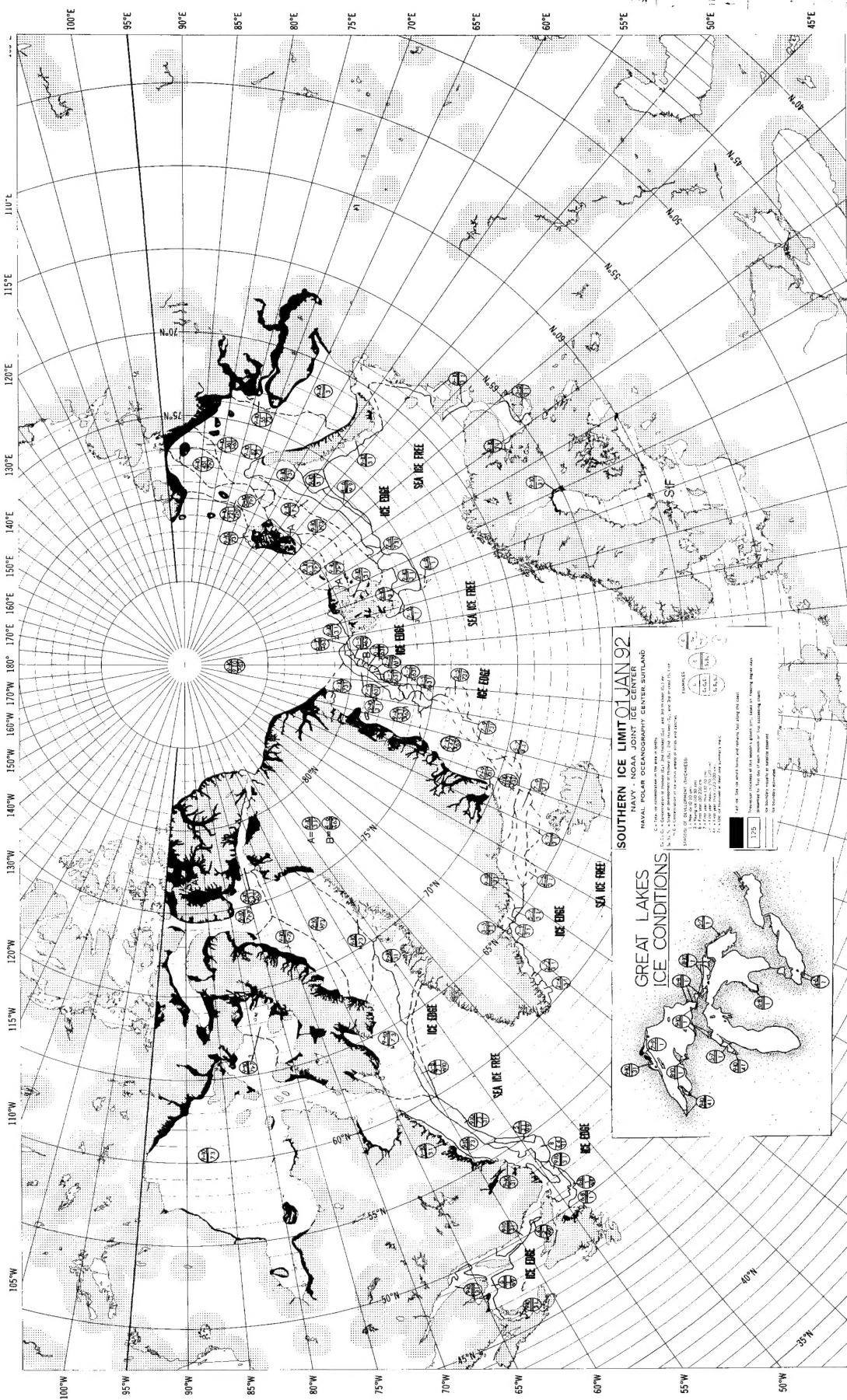
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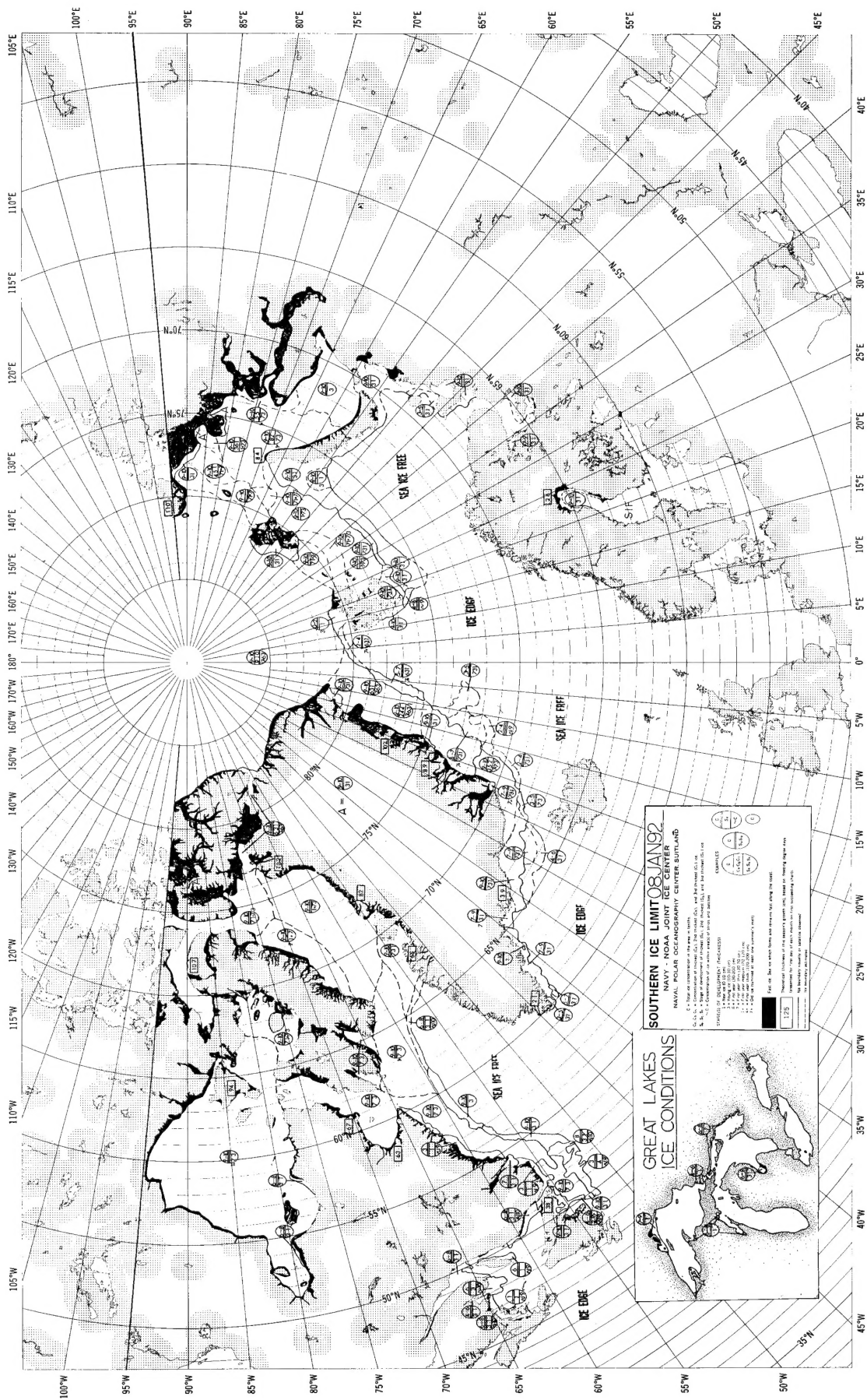
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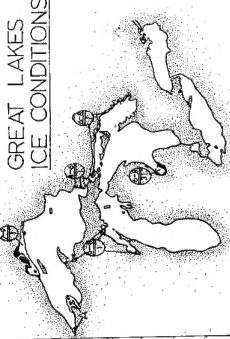
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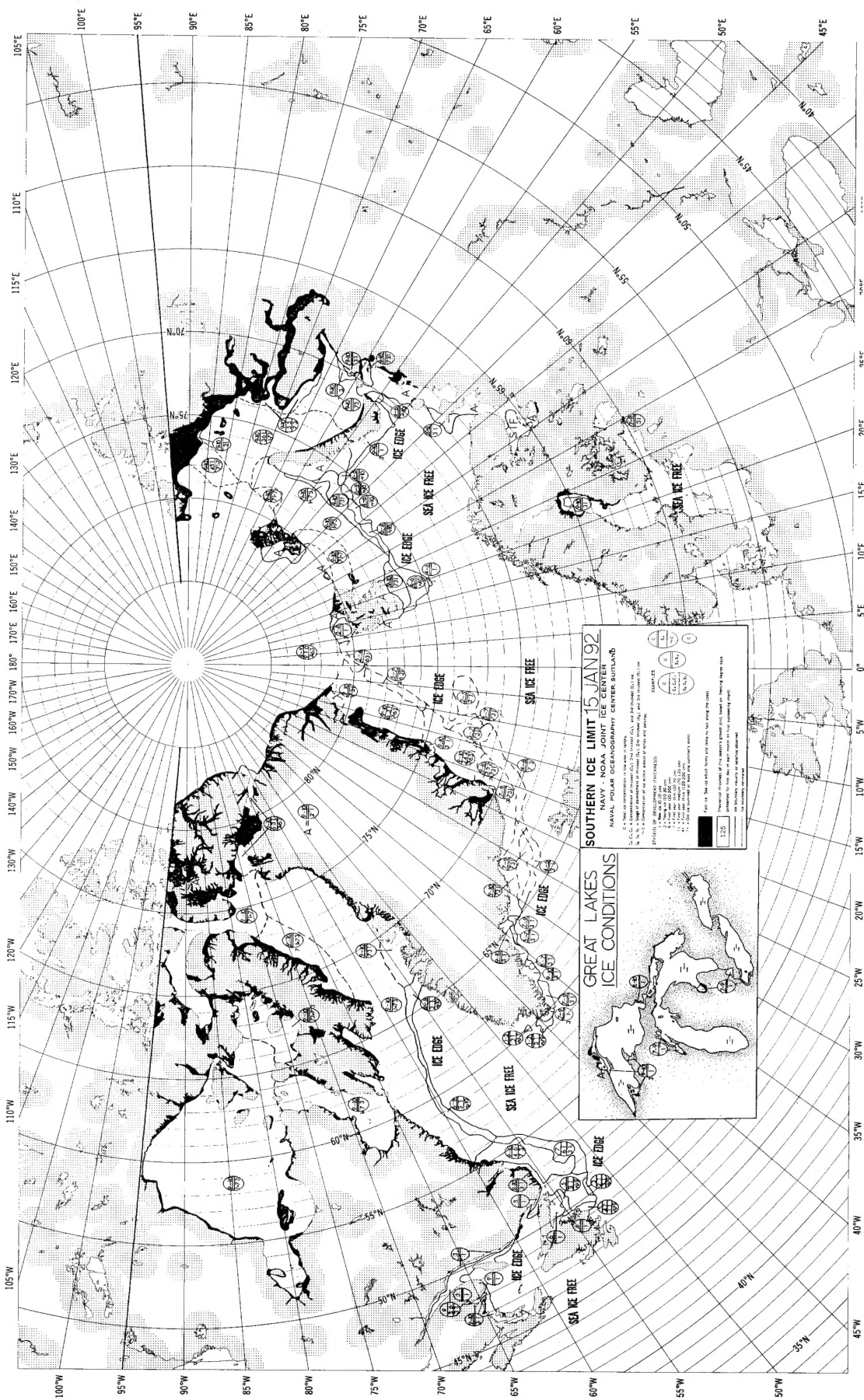
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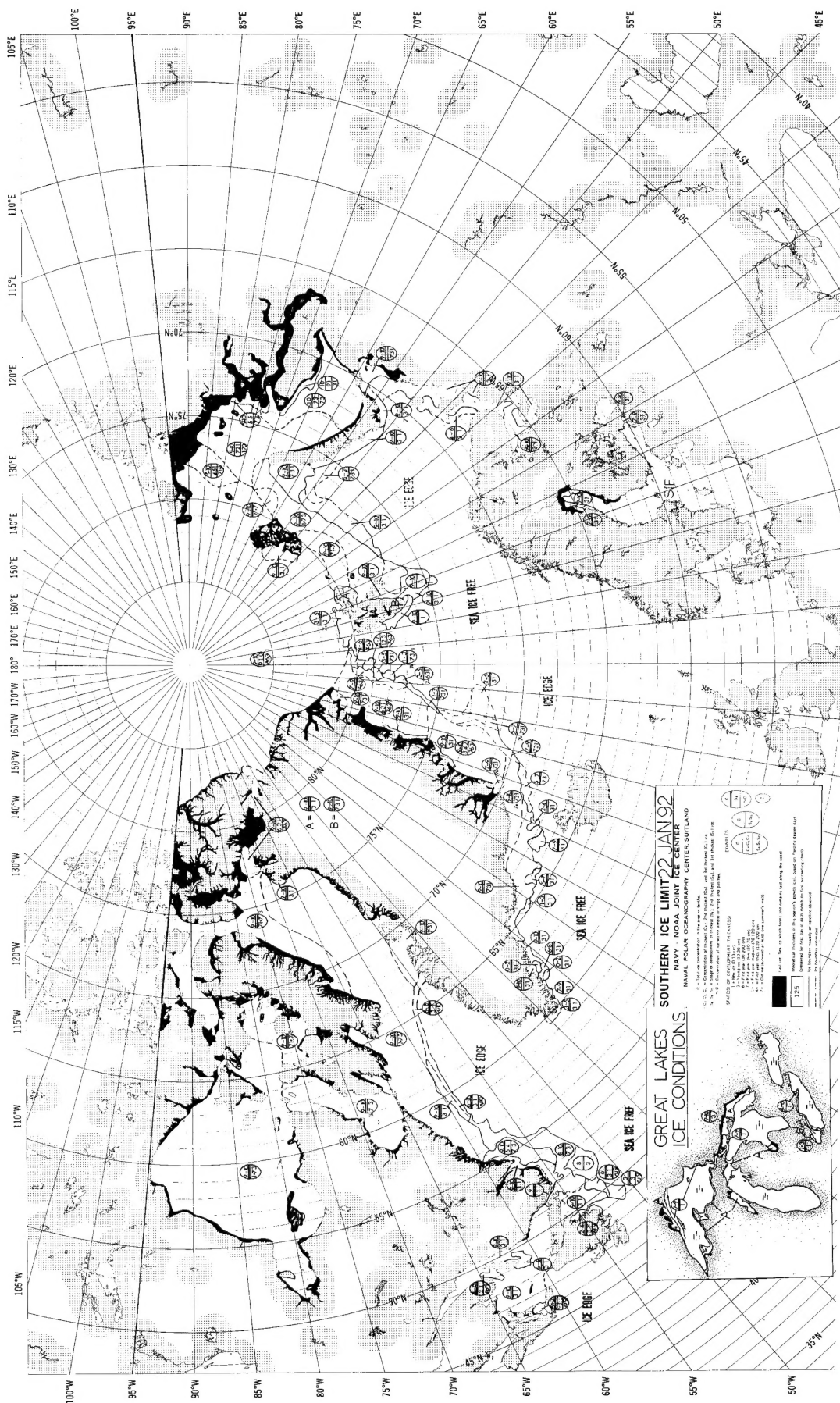


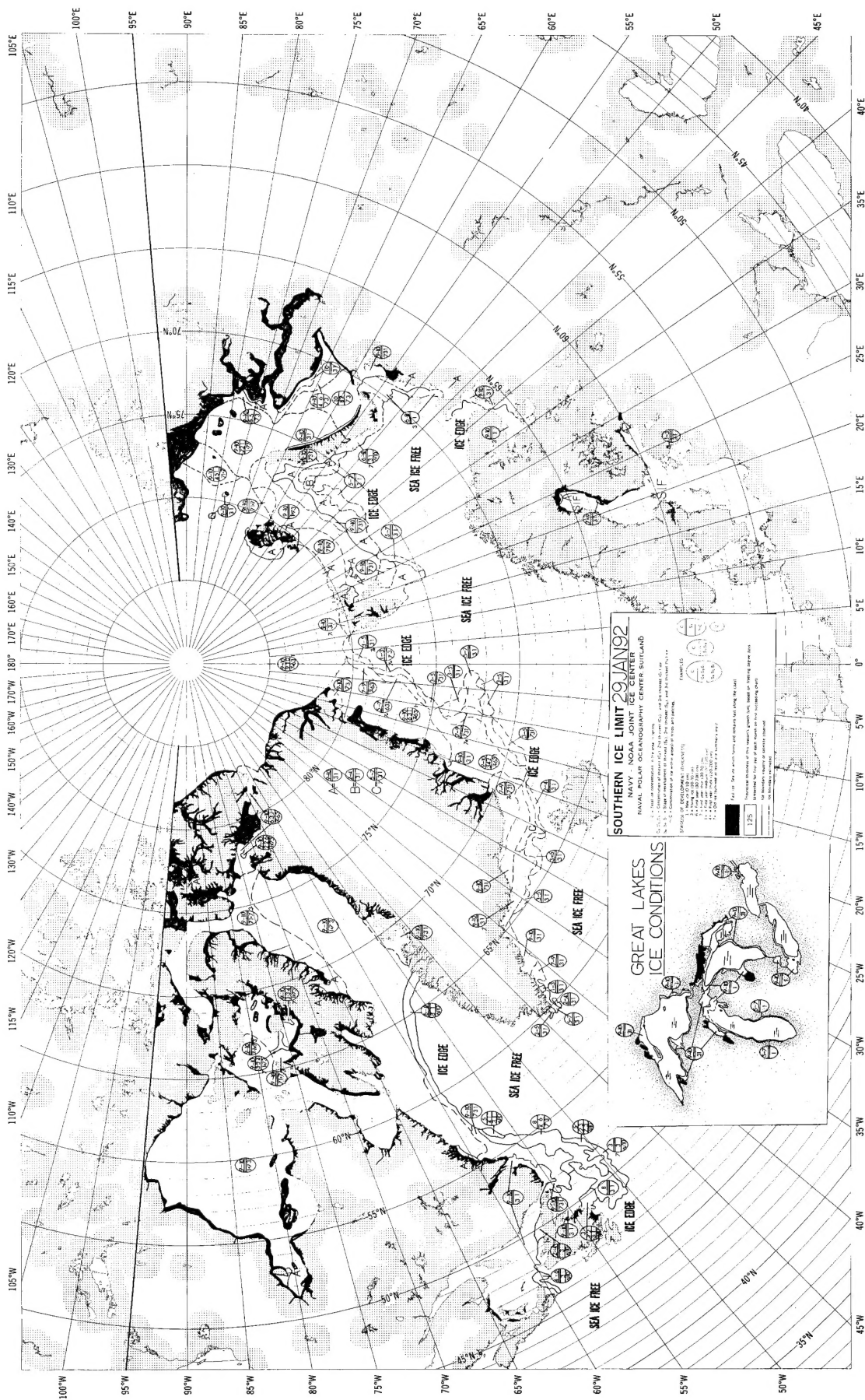
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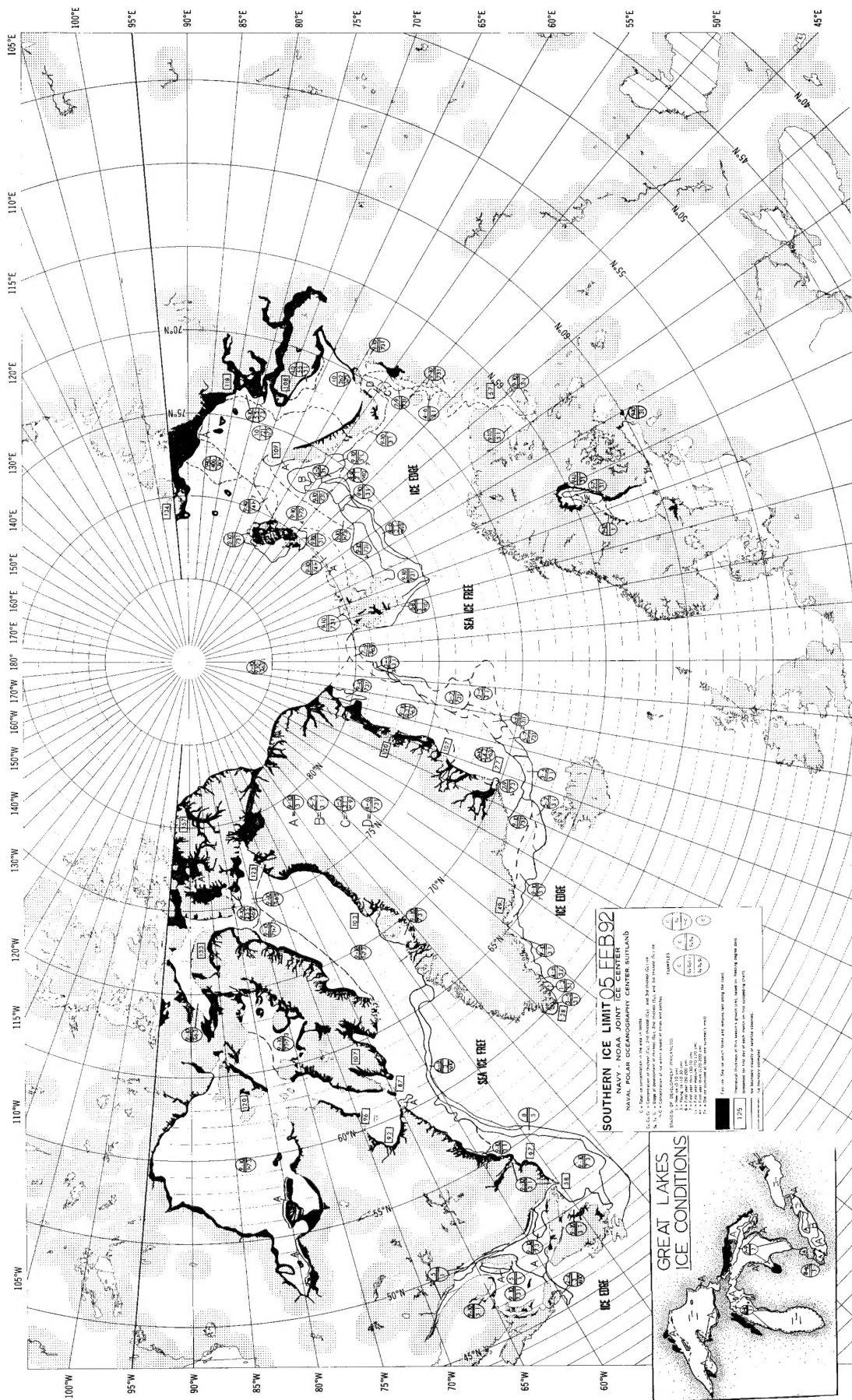
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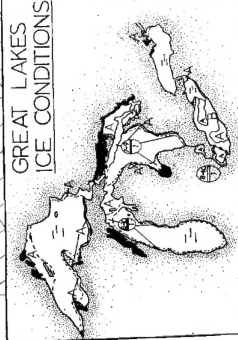


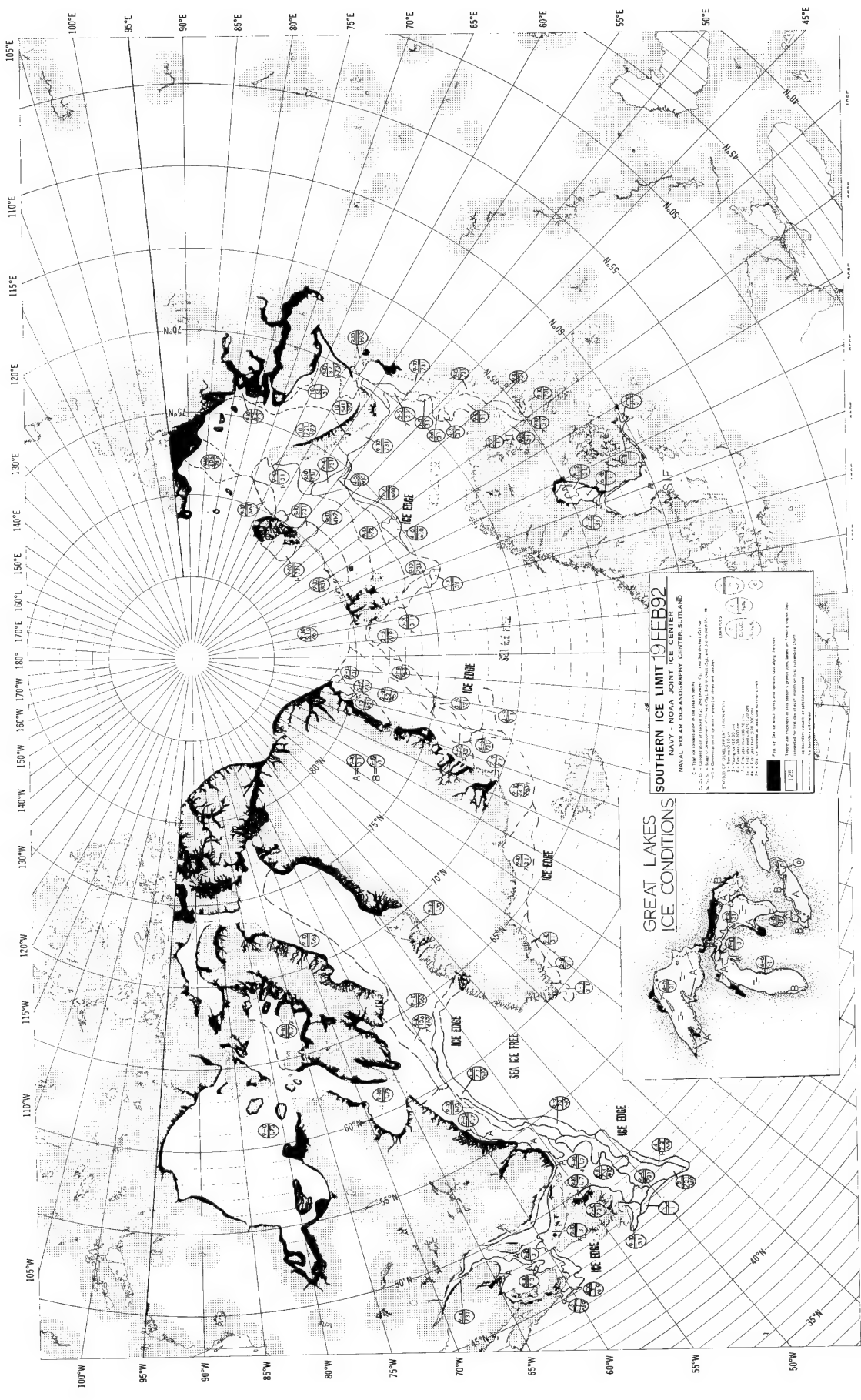




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NAVAL POLAR OCEANOGRAPHY CENTER BUTLAND

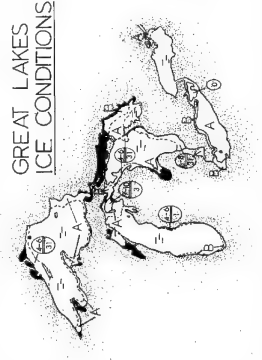
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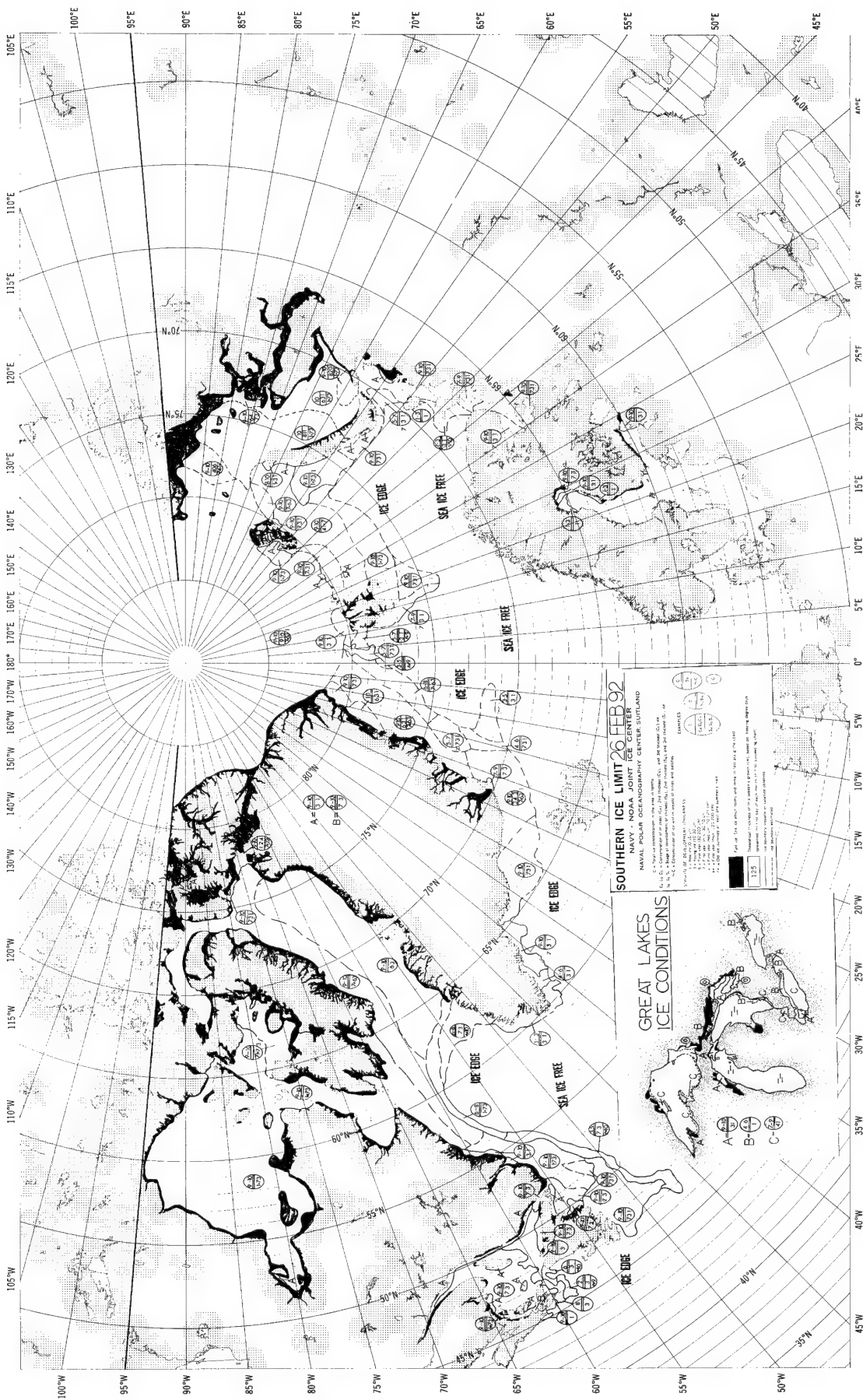


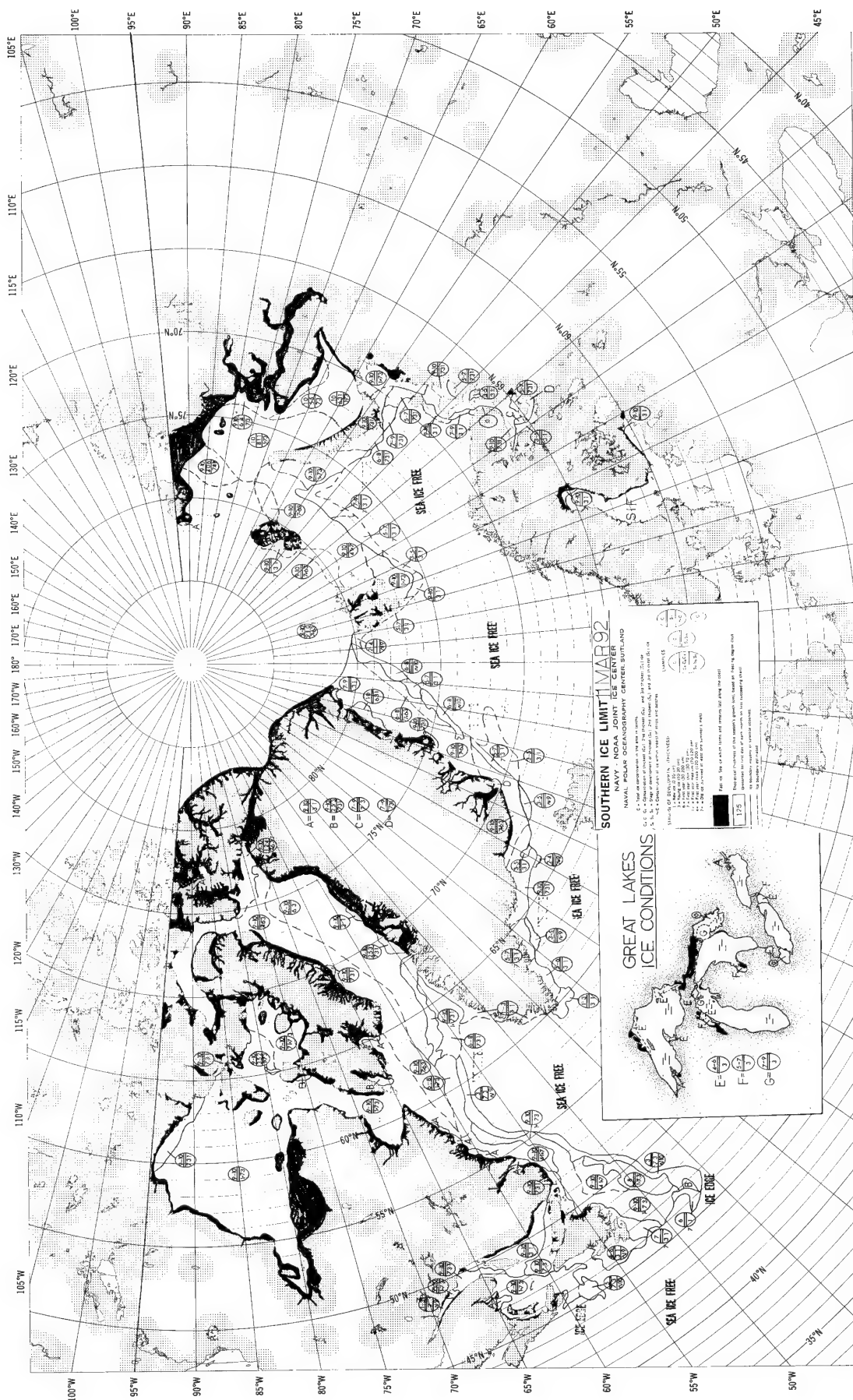


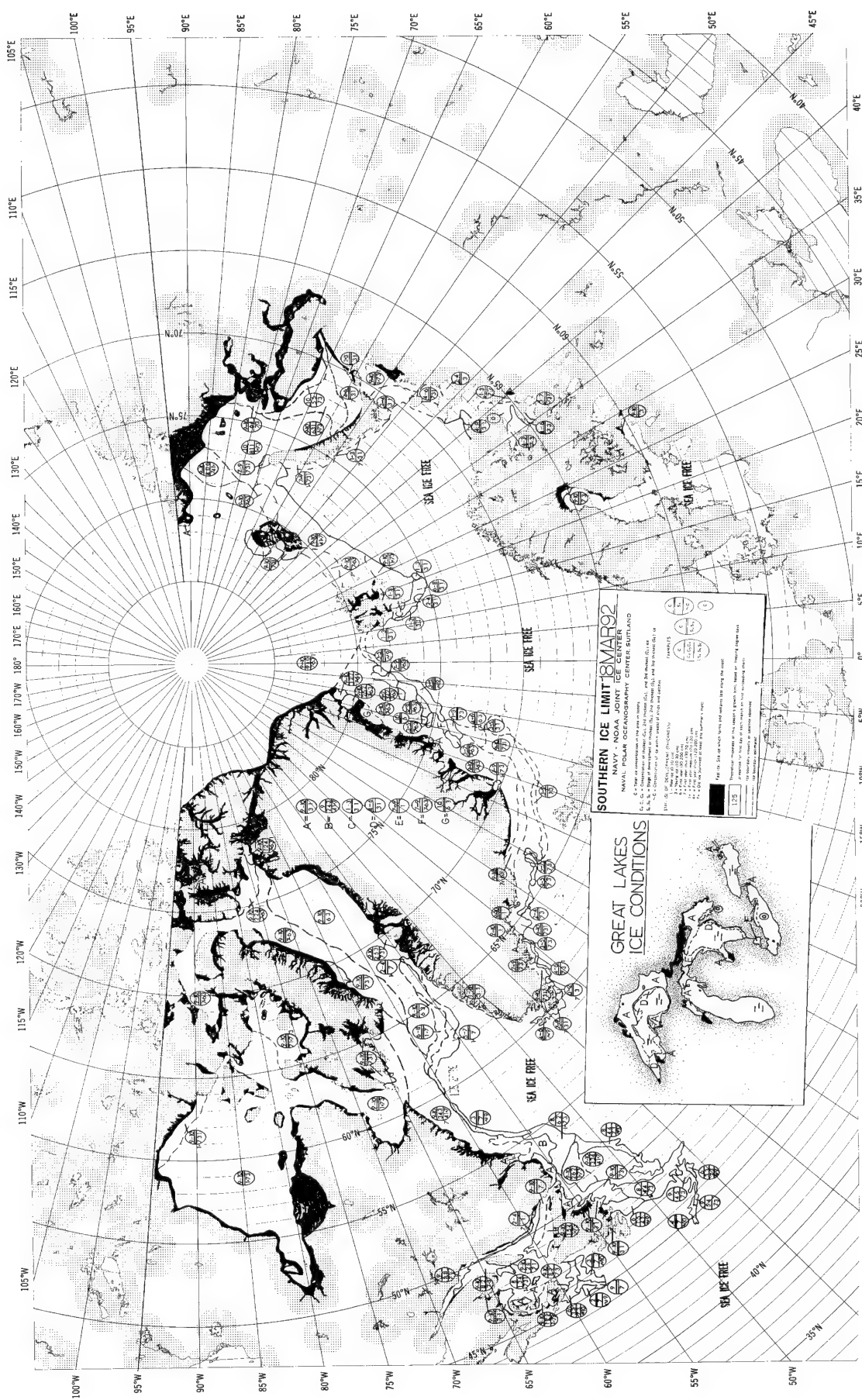
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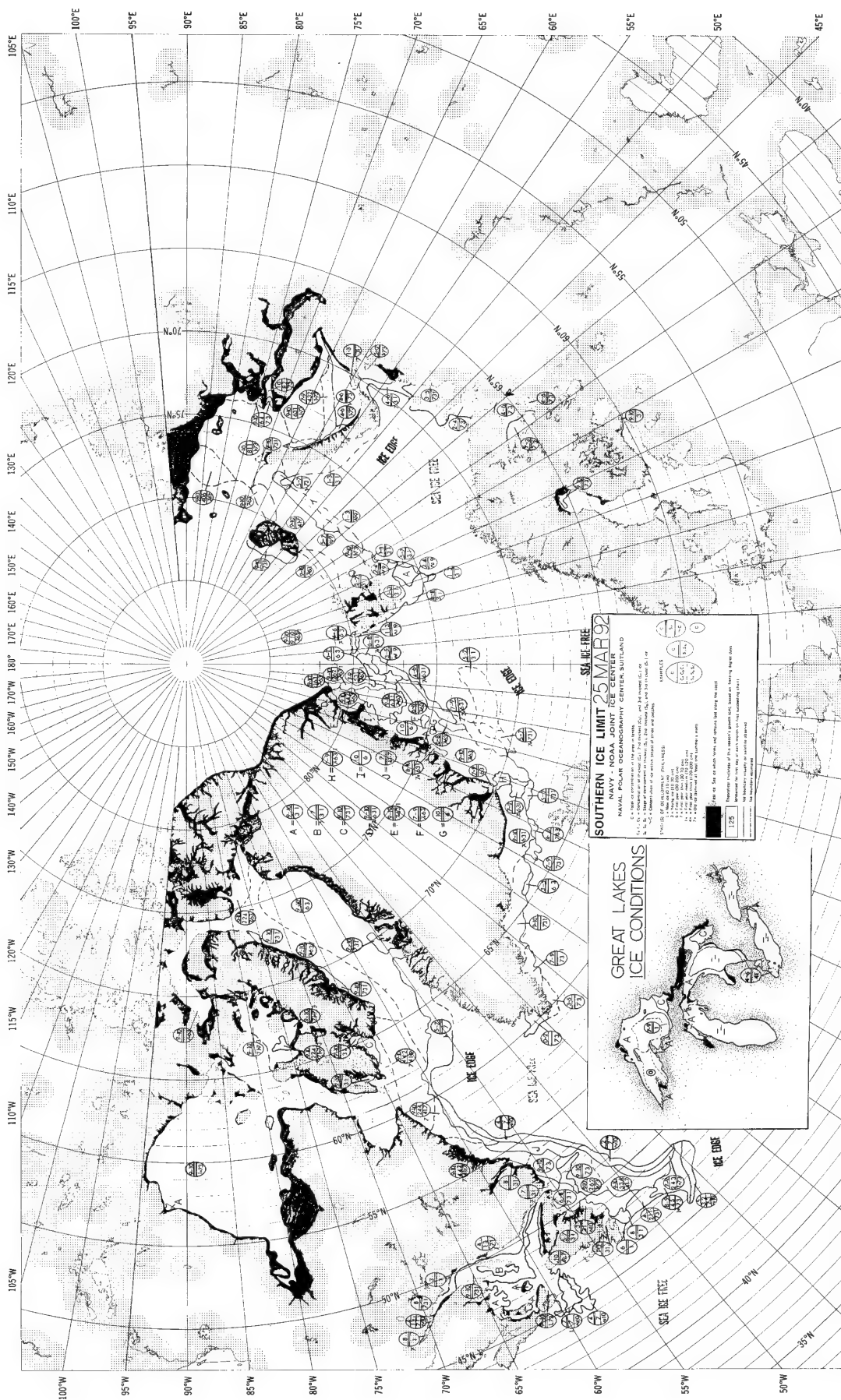
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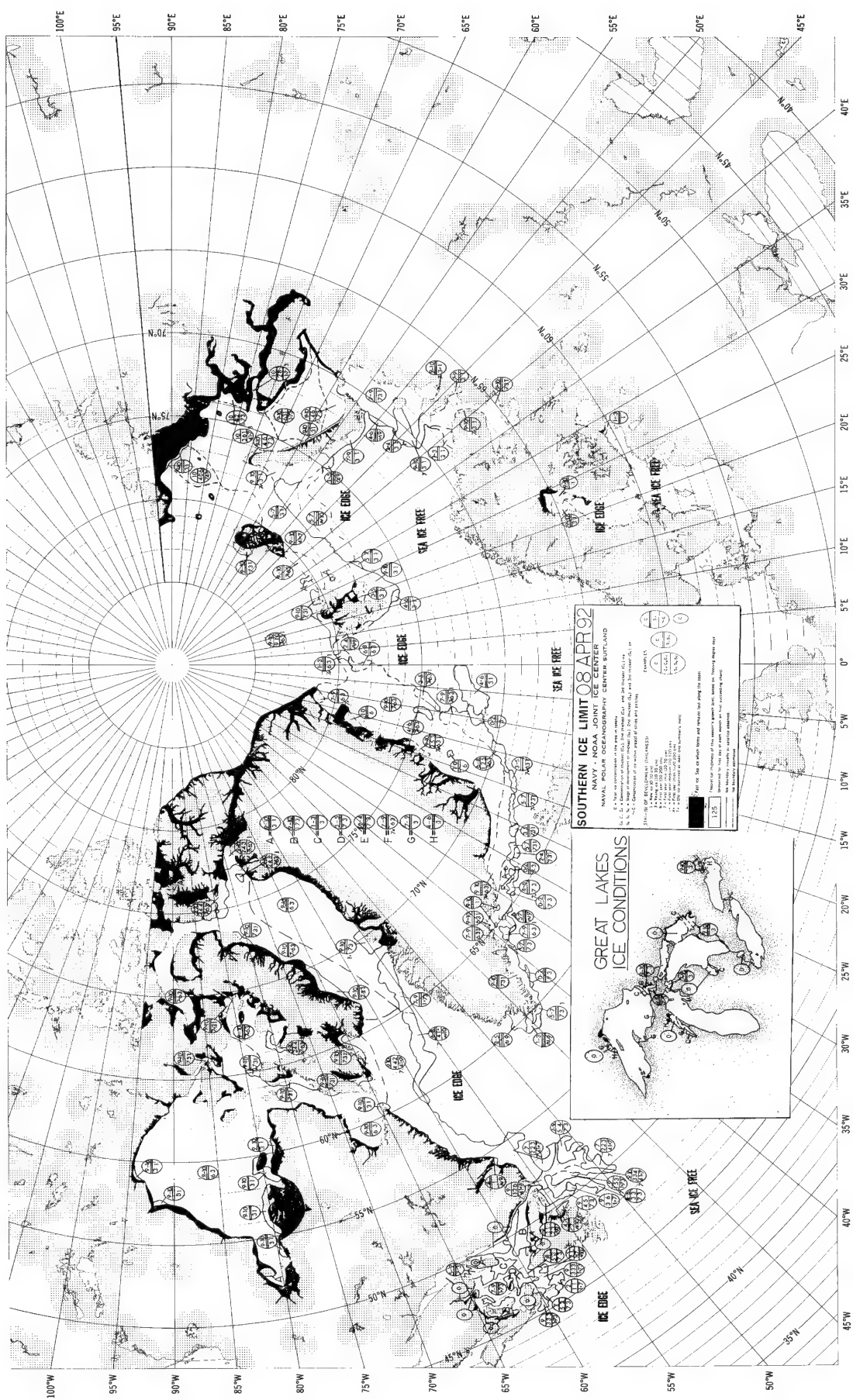


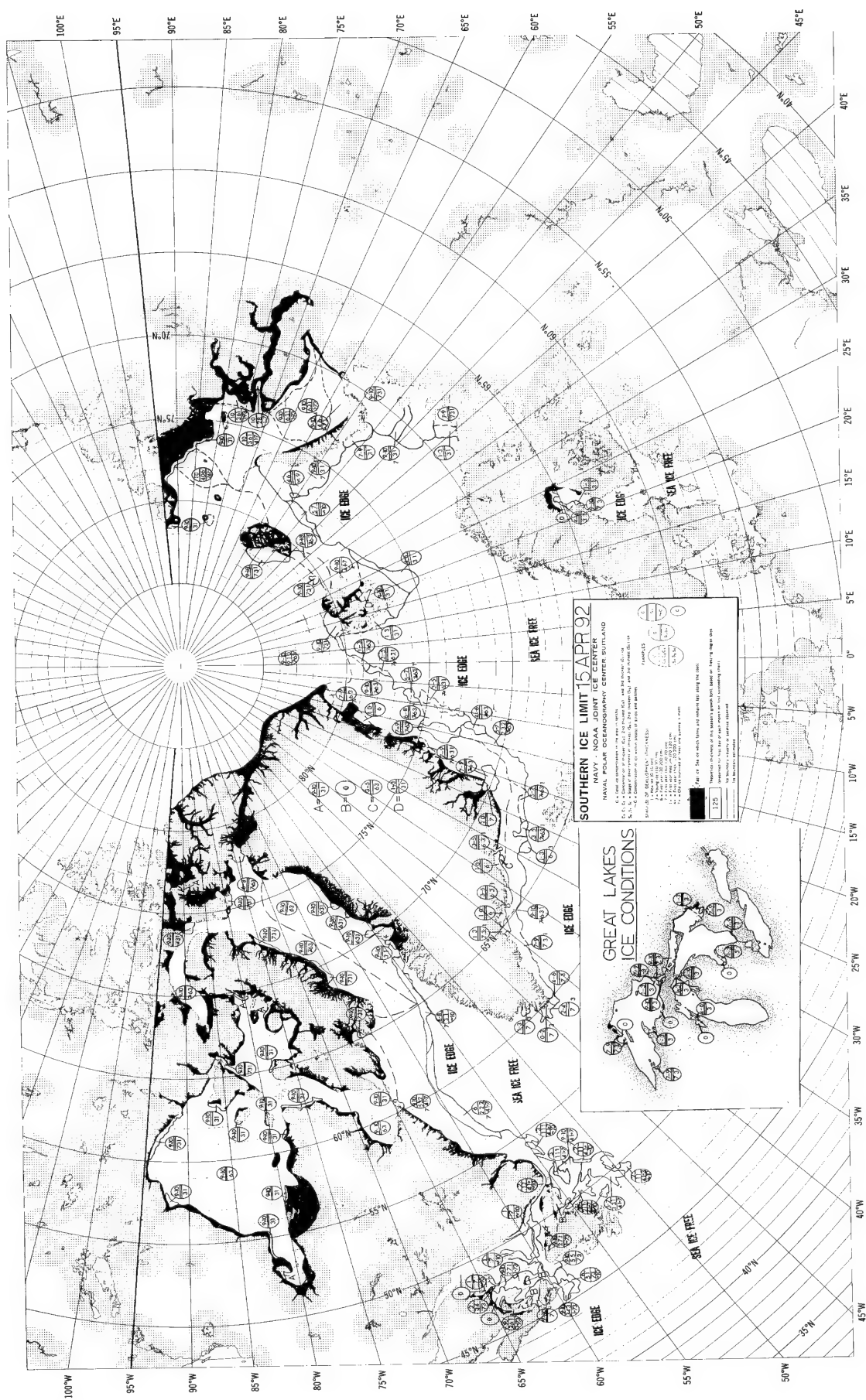


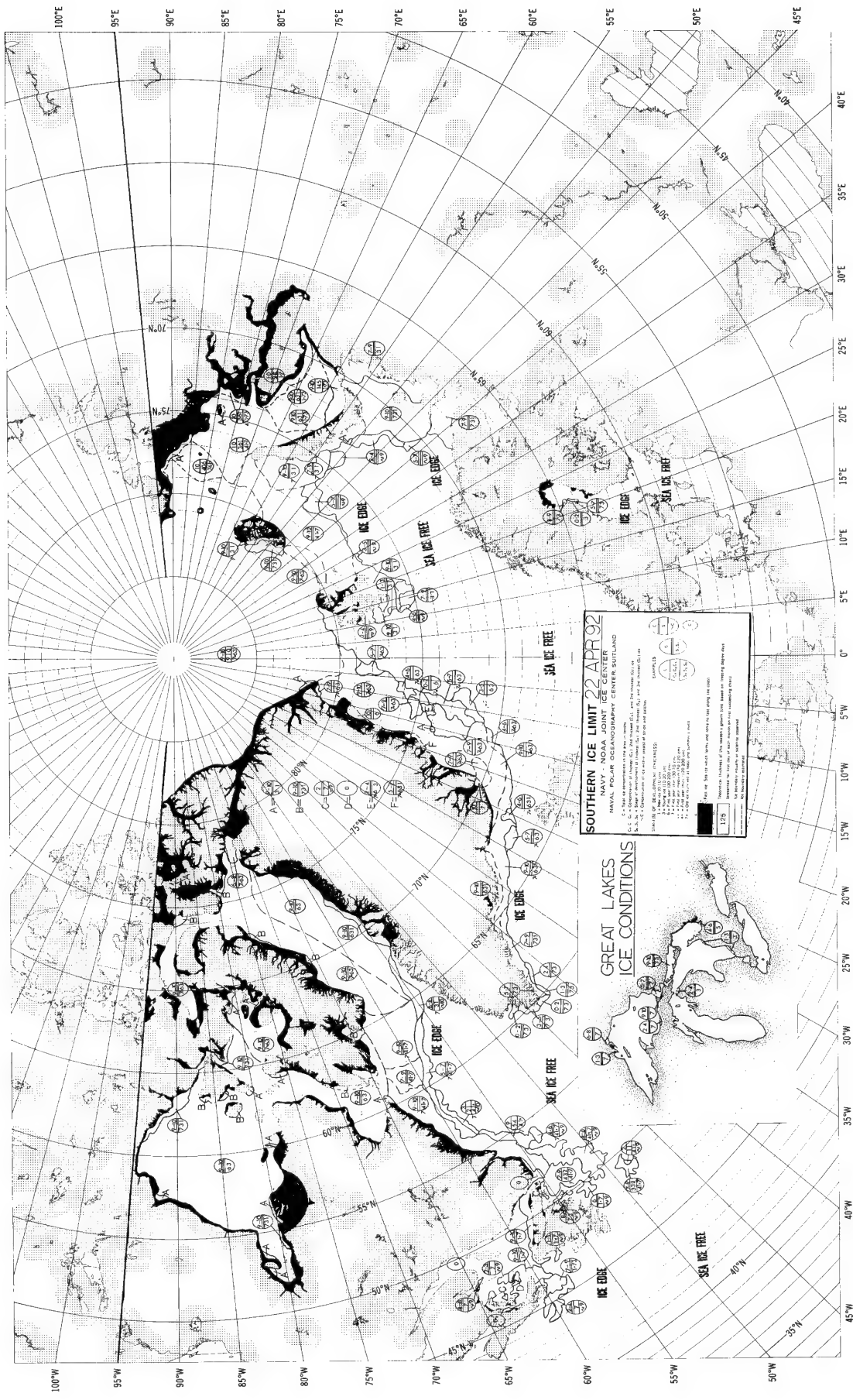












SOUTHERN ICE LIMIT 22 APR 92
NAVY - NOAA JOINT ICE CENTER
NAVAL OCEANOGRAPHY CENTER, BUTLAND

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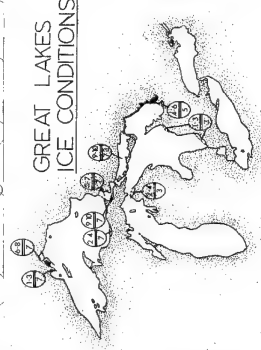
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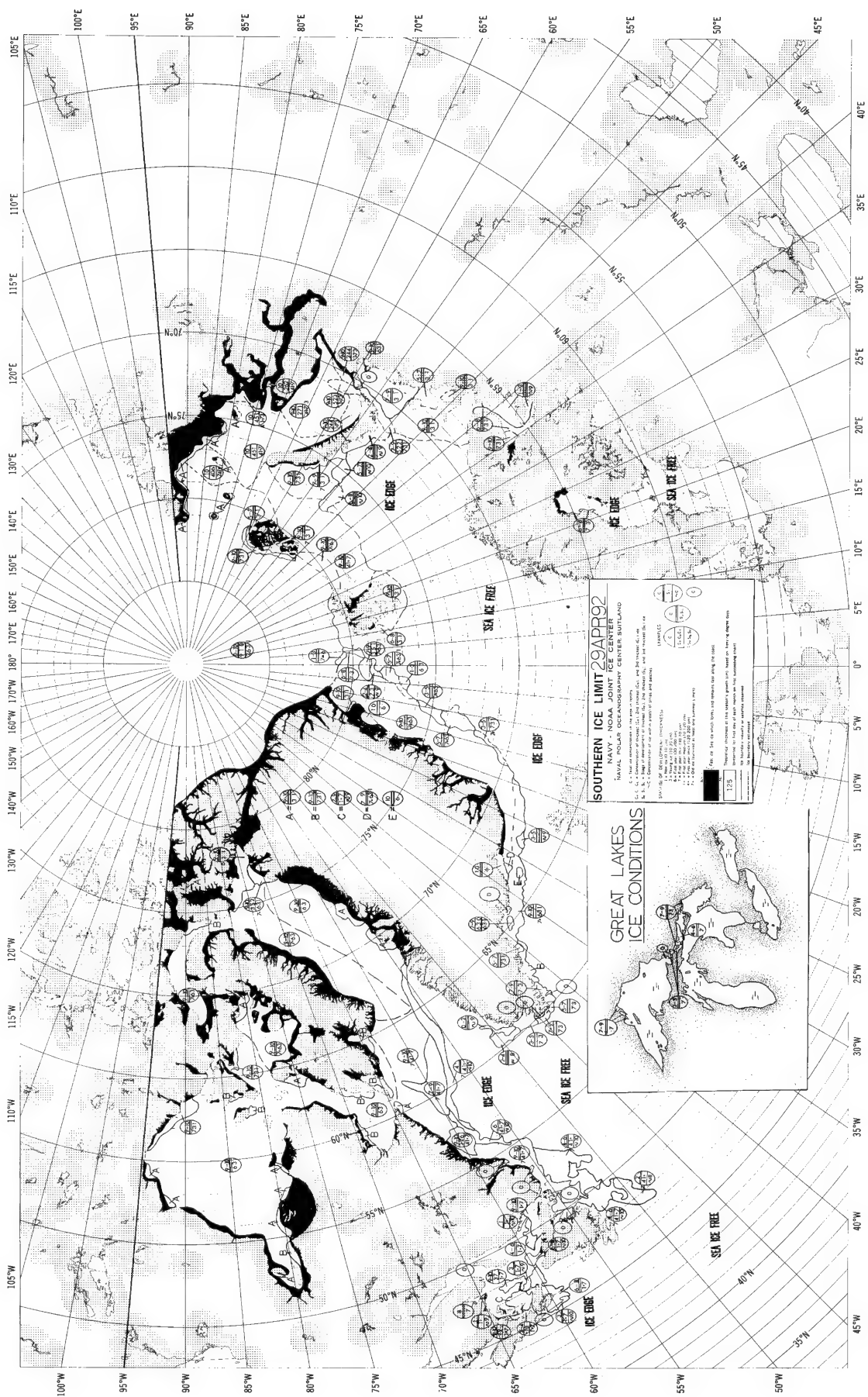
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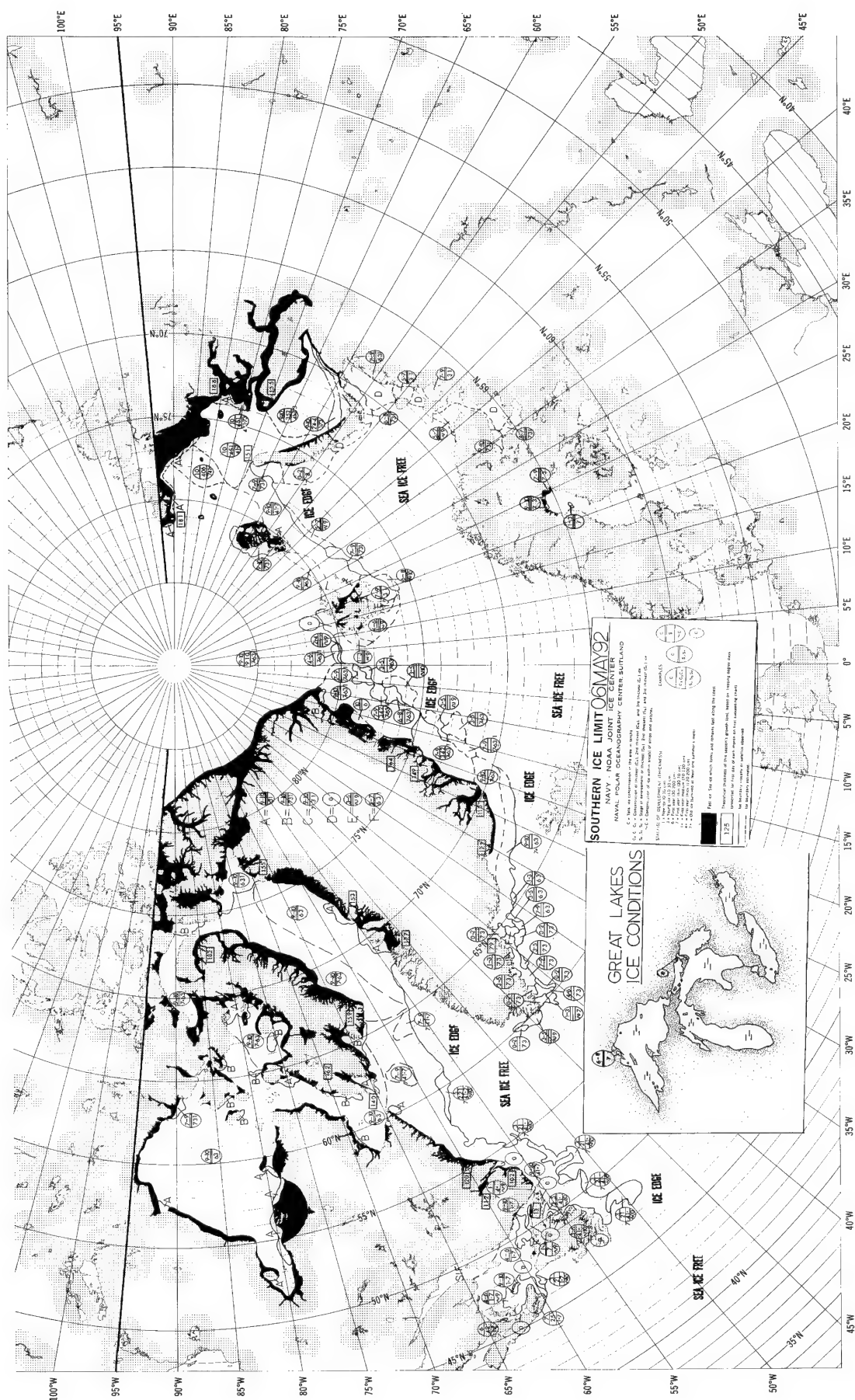
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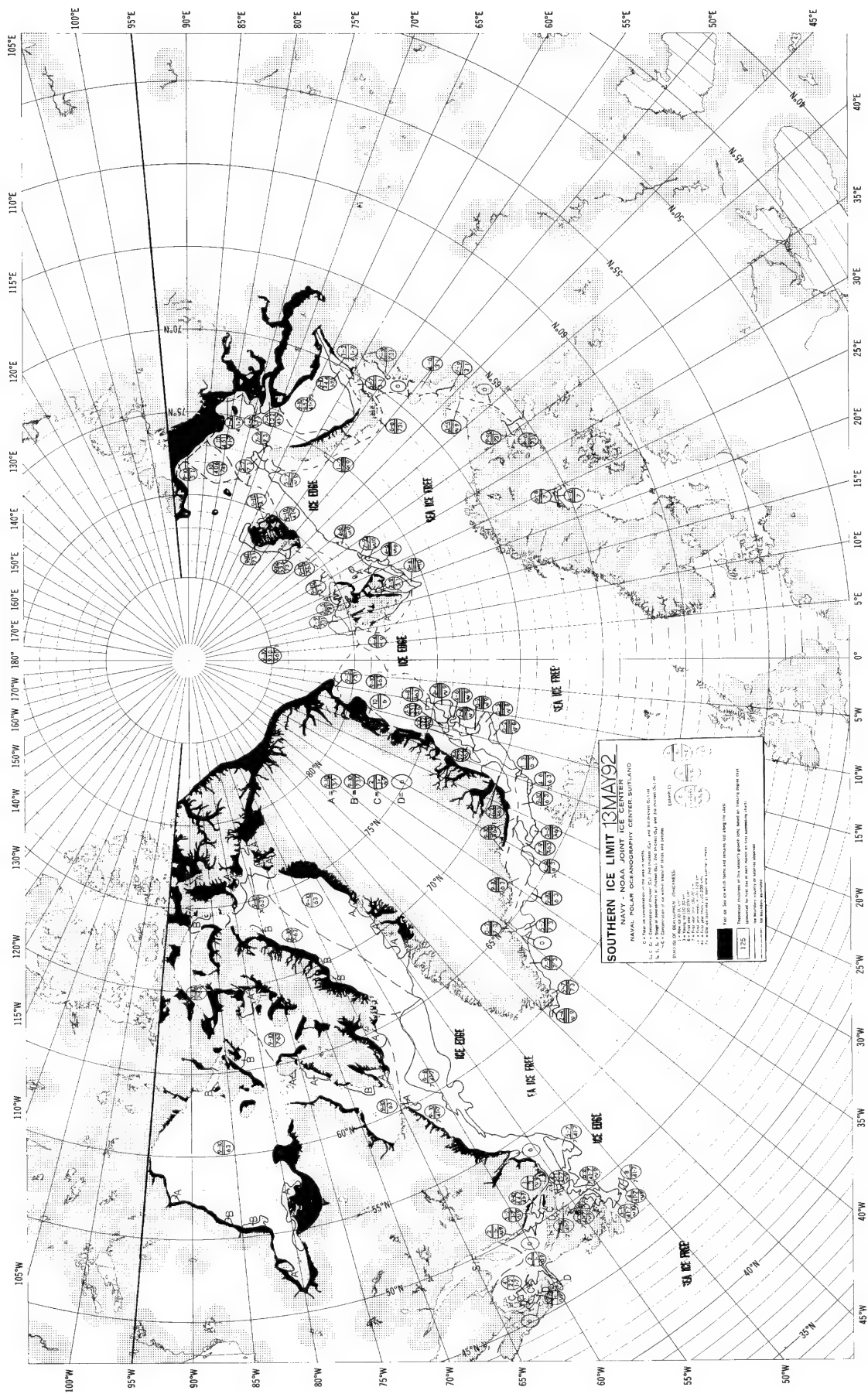
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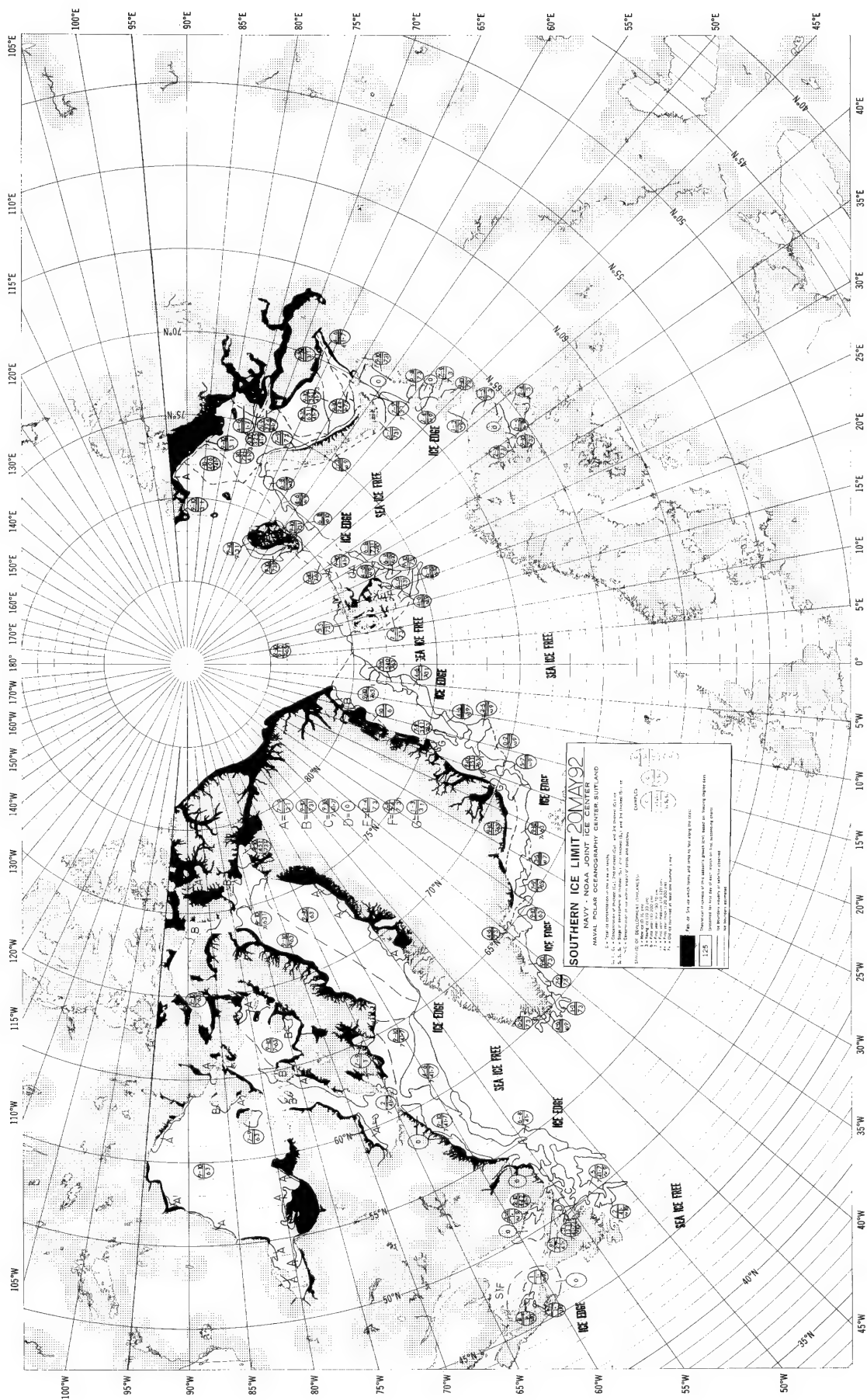
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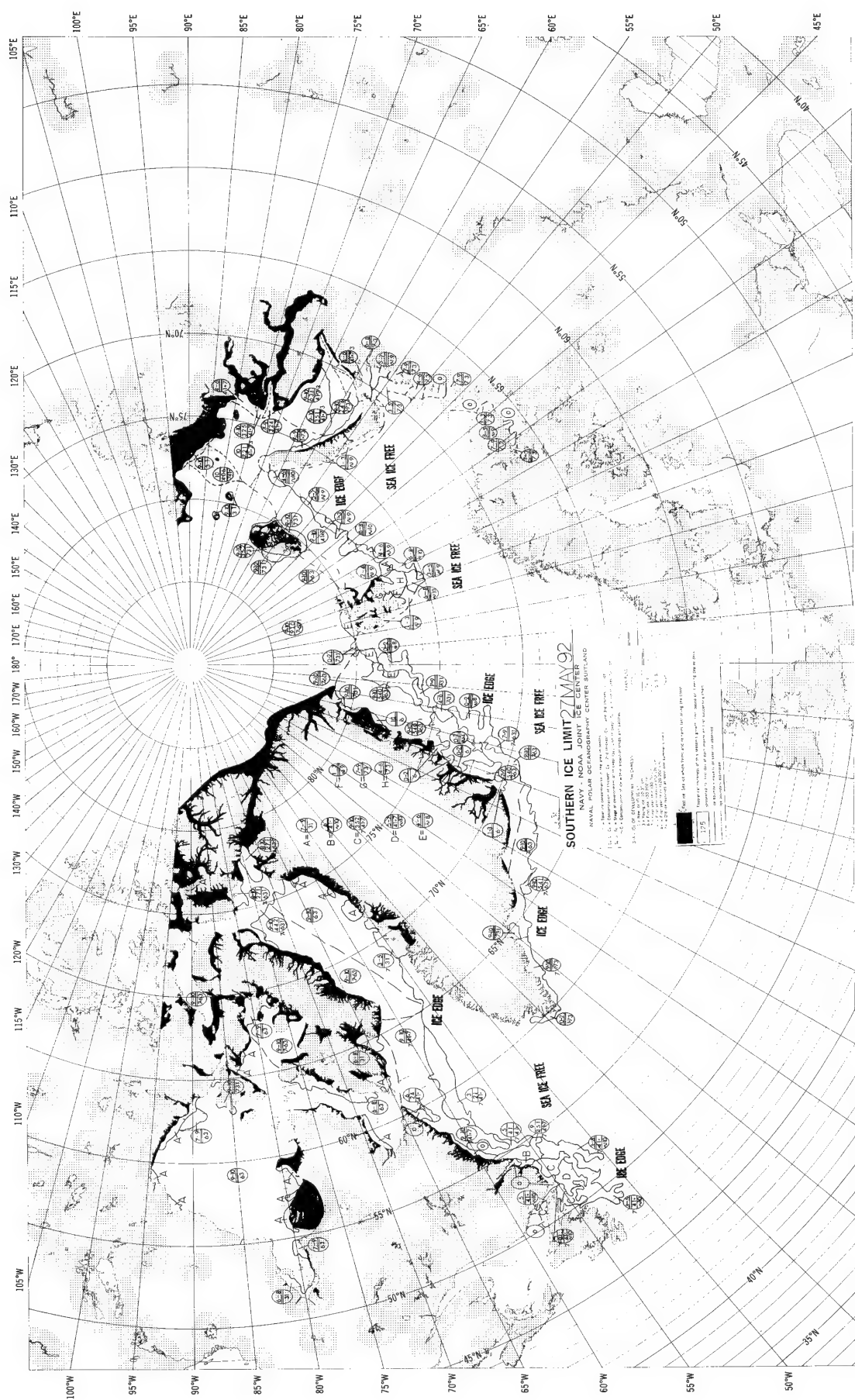


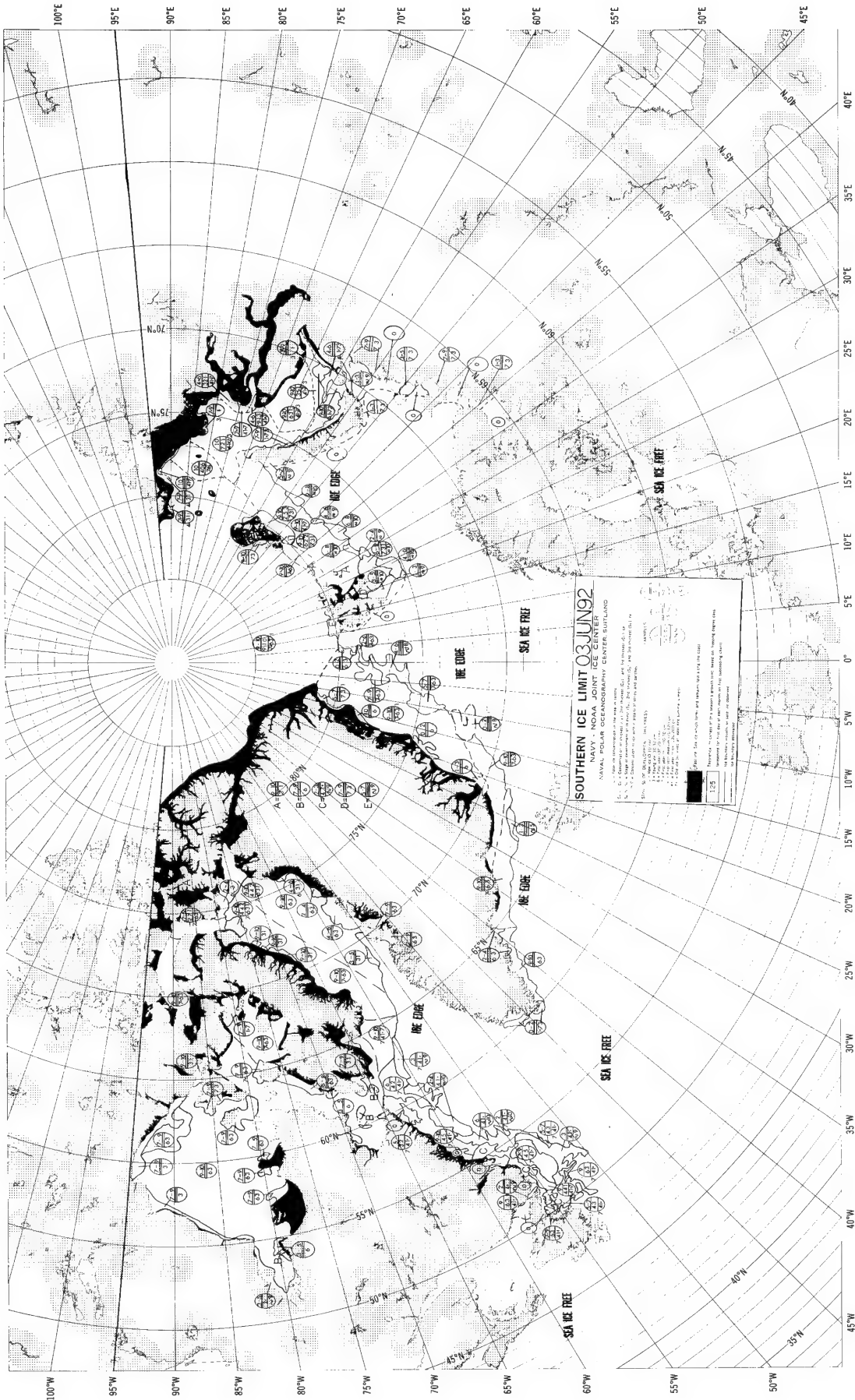


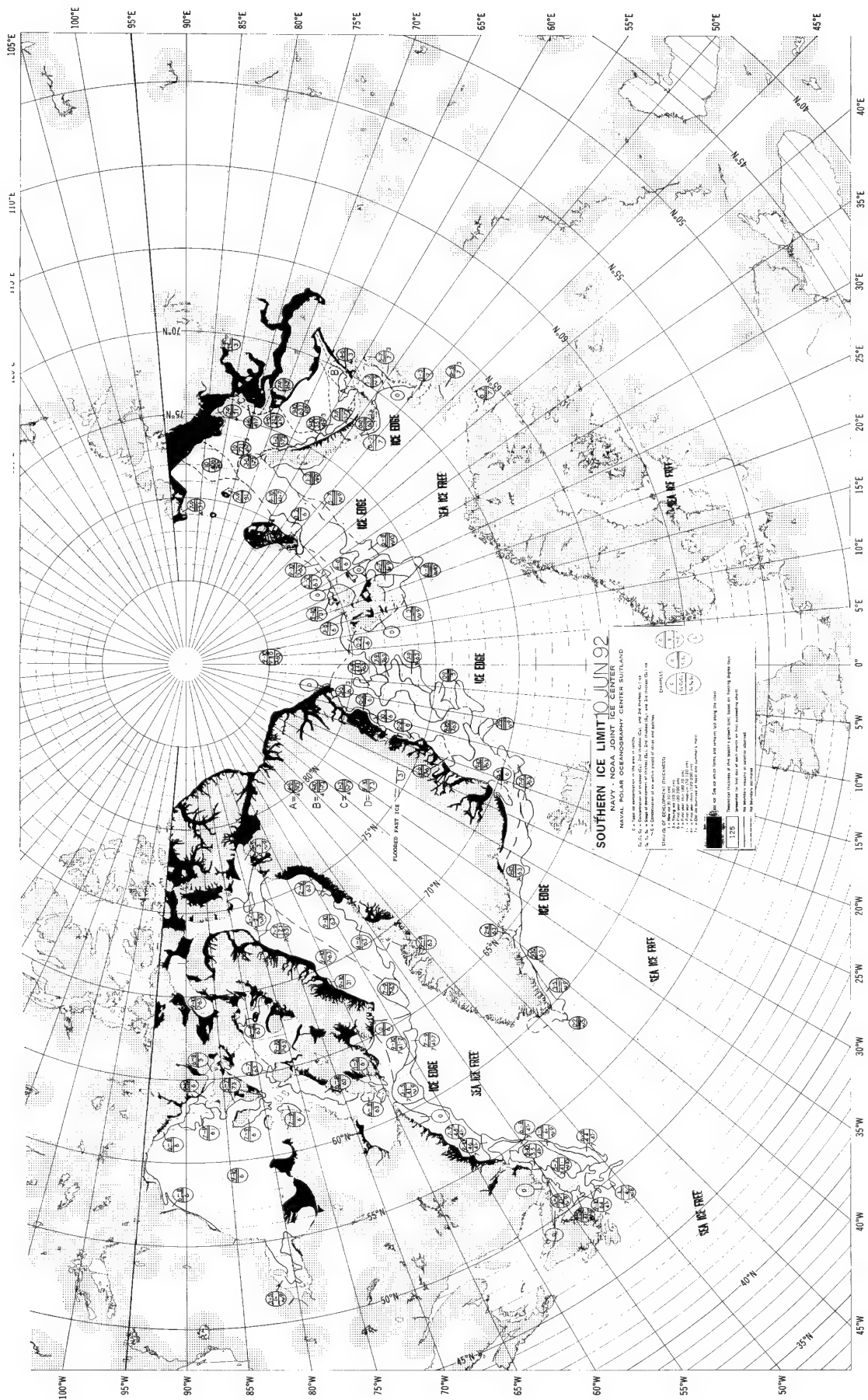


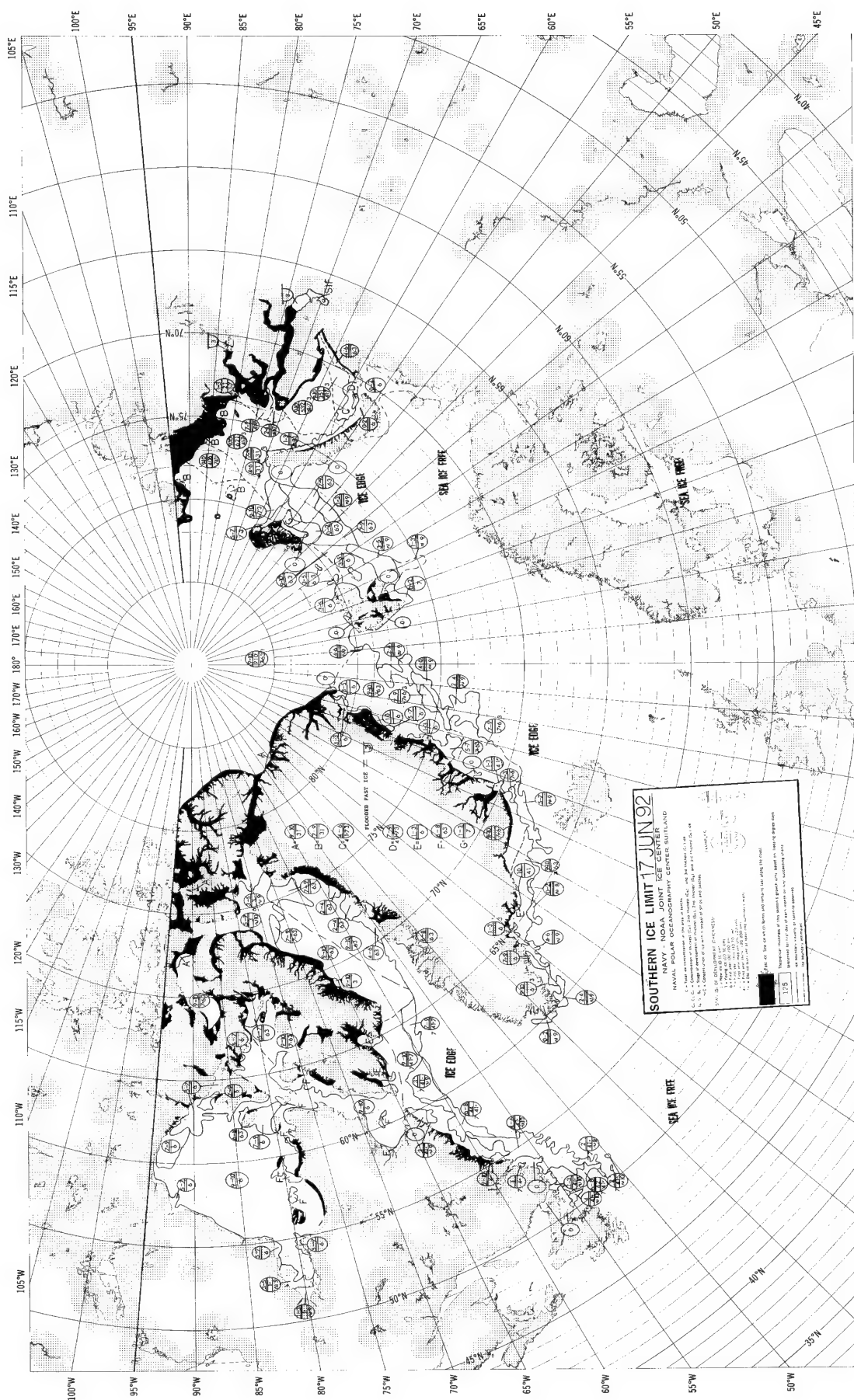


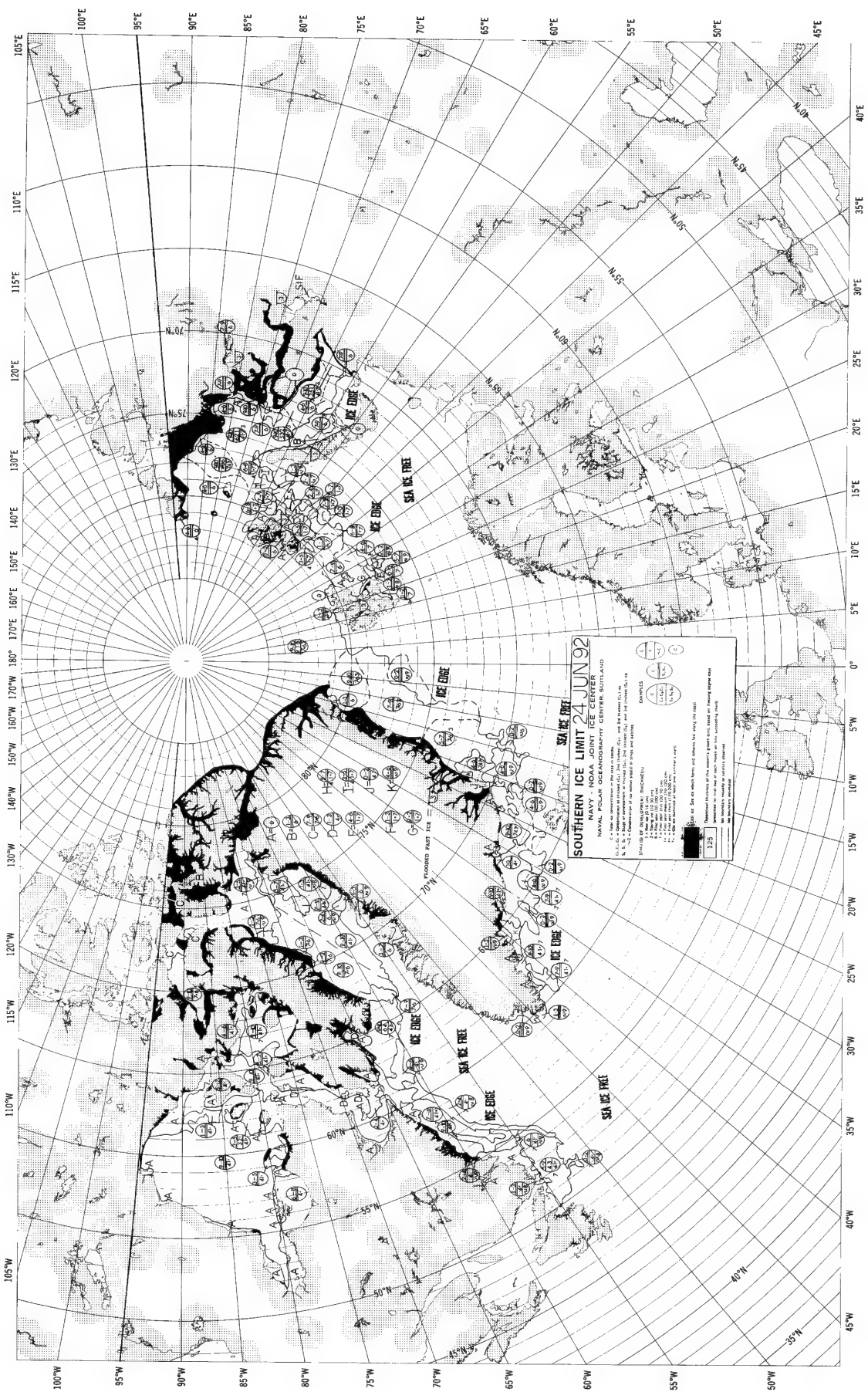


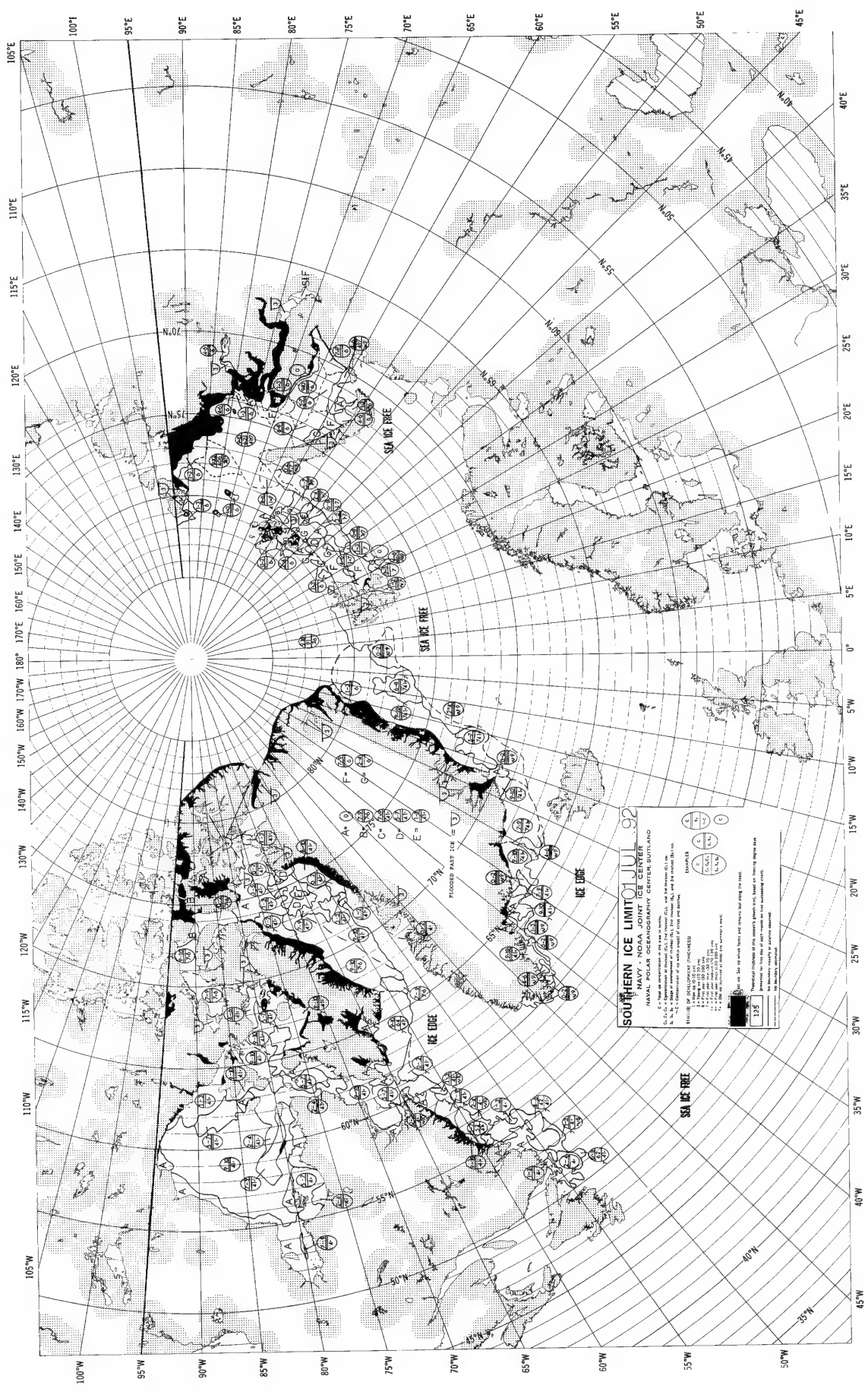












SOUTHERN ICE LIMITS JUL 92
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER, BUTLAND

1. **SEA ICE FREE** - Areas where ice is not present. (See legend for symbols.)
2. **ICE DENS** - Areas where ice density is greater than 0.917 g/cm³. (See legend for symbols.)
3. **ICE EDGE** - Areas where ice edge is present. (See legend for symbols.)
4. **SEA ICE FREE** - Areas where ice is not present. (See legend for symbols.)
5. **ICE DENS** - Areas where ice density is greater than 0.917 g/cm³. (See legend for symbols.)
6. **ICE EDGE** - Areas where ice edge is present. (See legend for symbols.)

LEGEND

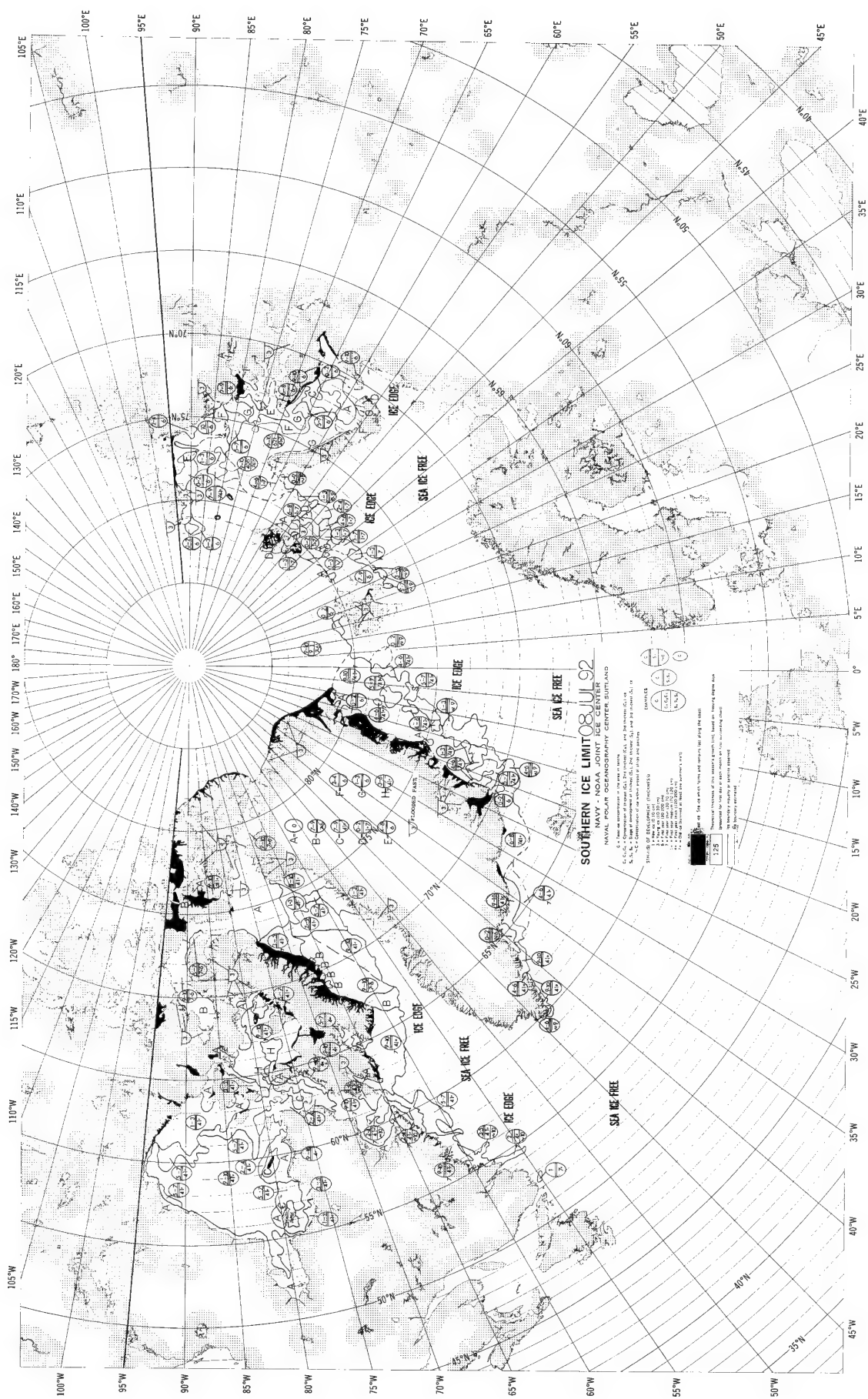
SEA ICE FREE - Areas where ice is not present. (See legend for symbols.)
ICE DENS - Areas where ice density is greater than 0.917 g/cm³. (See legend for symbols.)
ICE EDGE - Areas where ice edge is present. (See legend for symbols.)

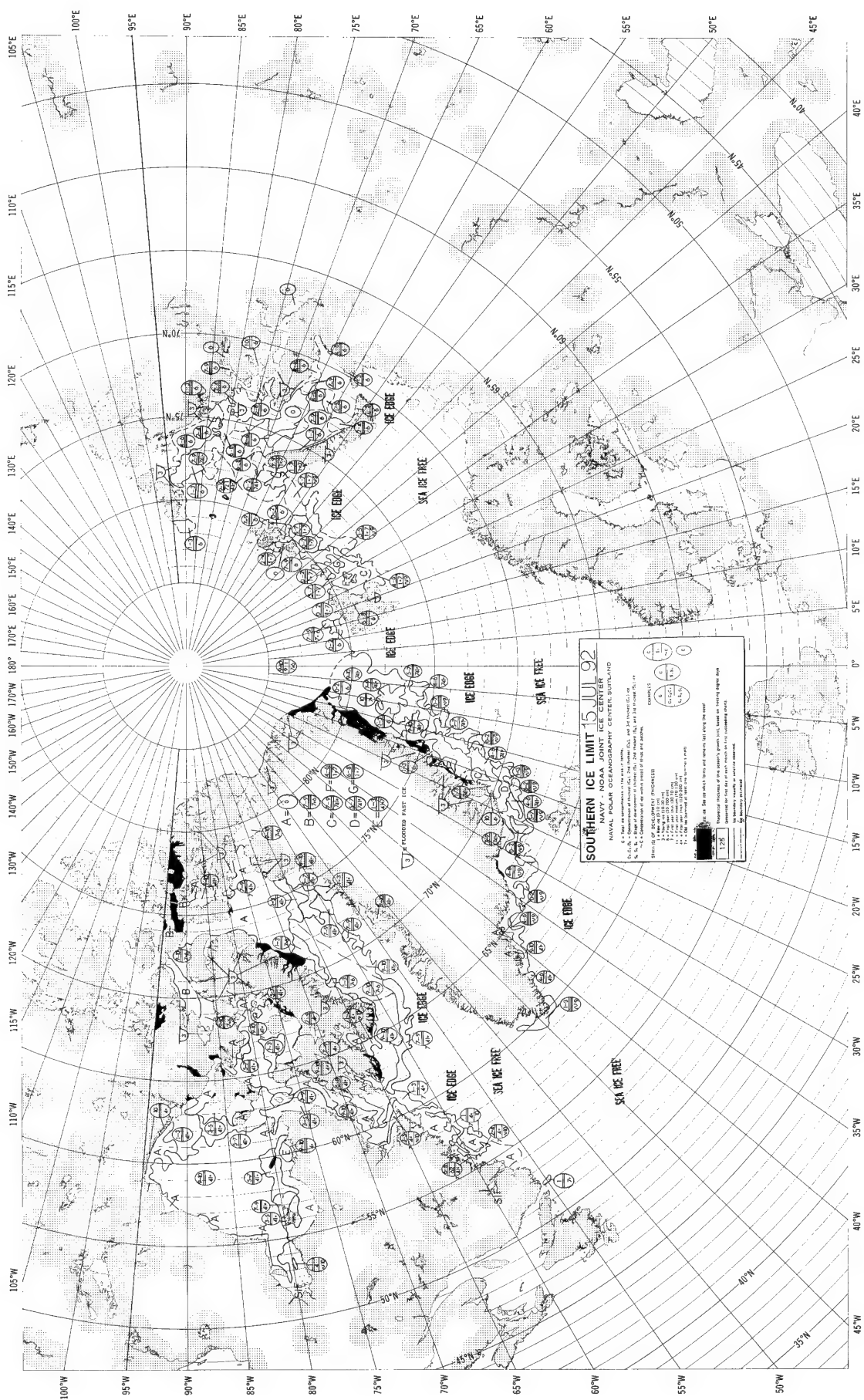
EXAMPLES

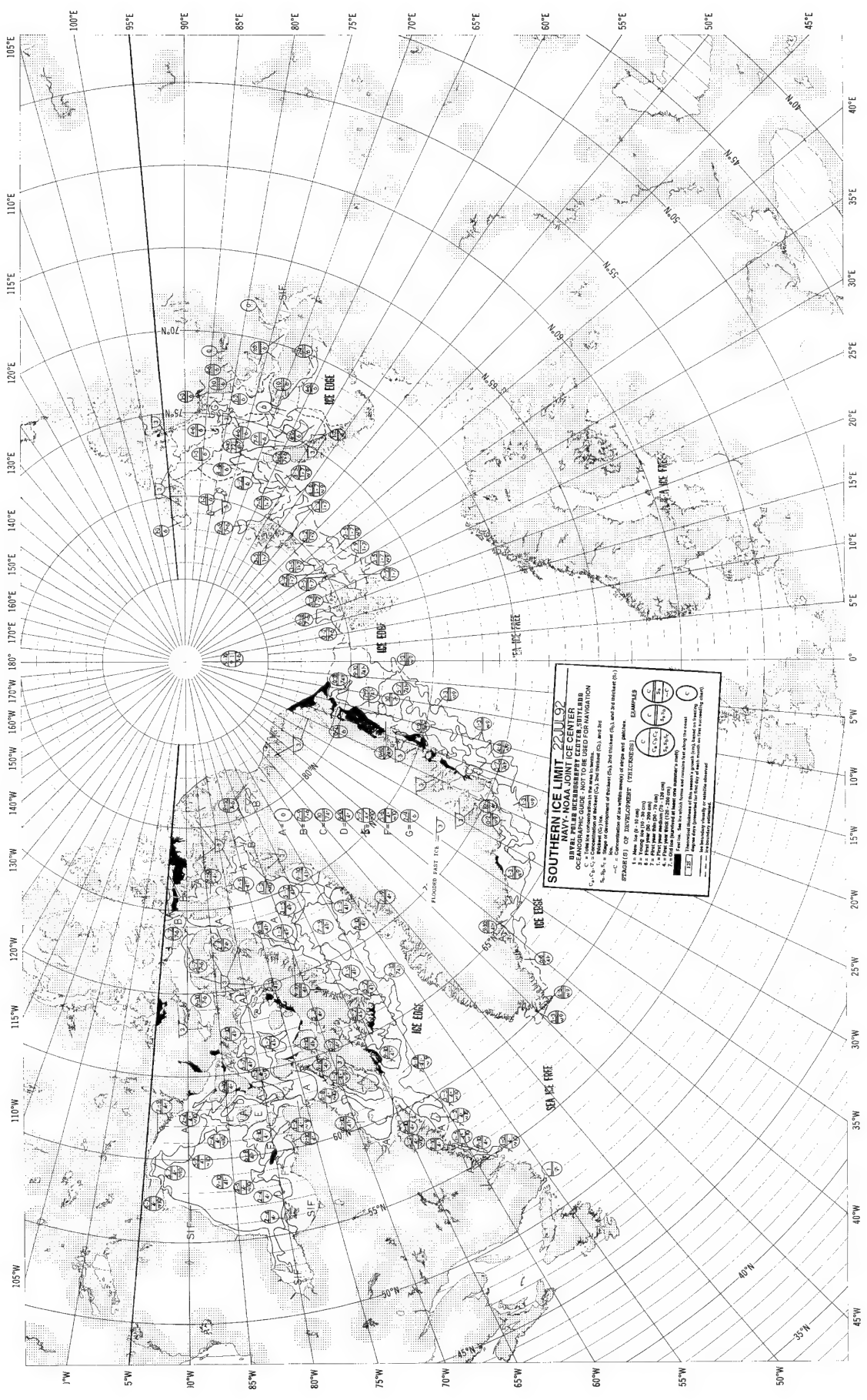
1. **SEA ICE FREE** - Areas where ice is not present. (See legend for symbols.)
2. **ICE DENS** - Areas where ice density is greater than 0.917 g/cm³. (See legend for symbols.)
3. **ICE EDGE** - Areas where ice edge is present. (See legend for symbols.)

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NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER, BUTLAND





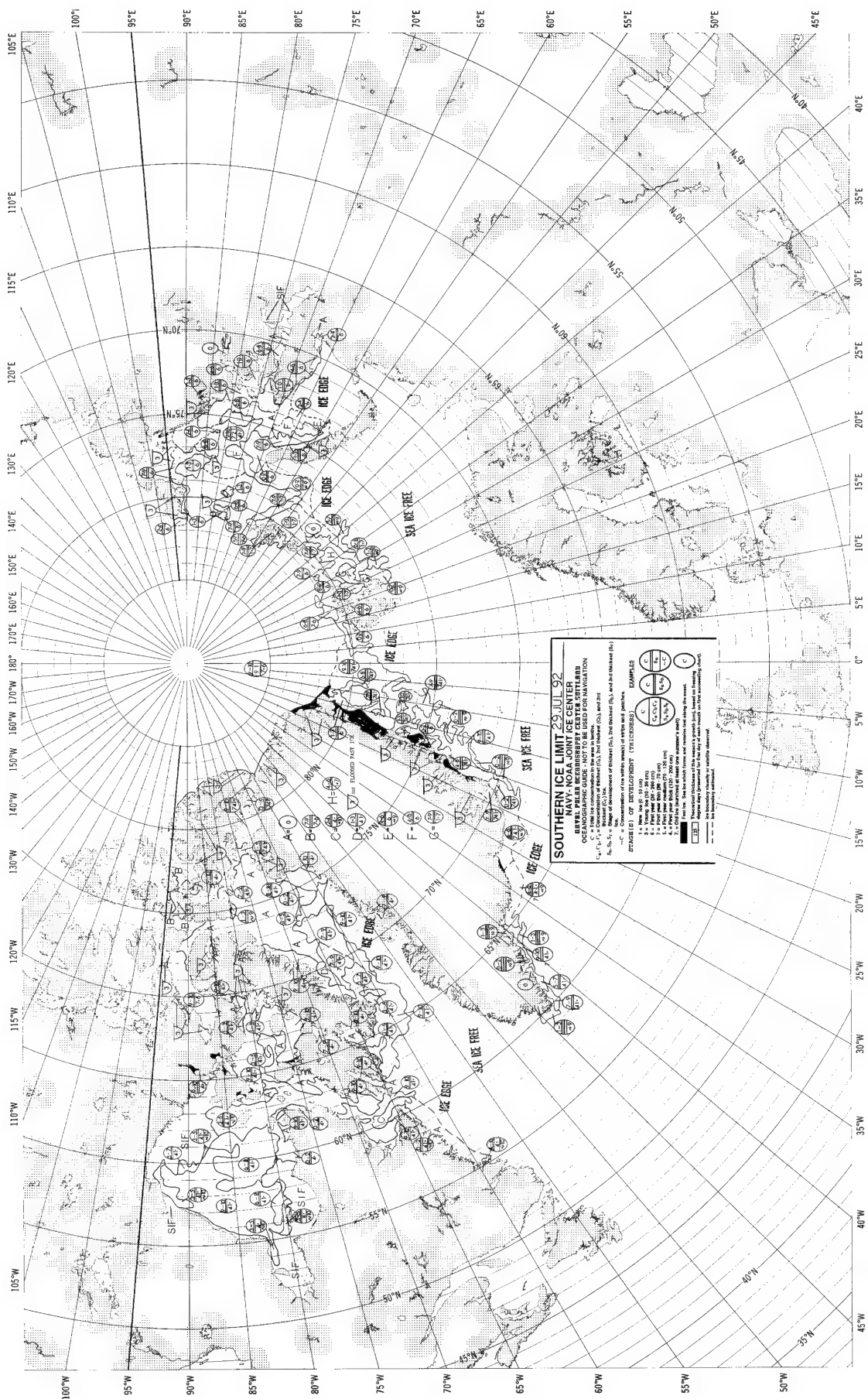


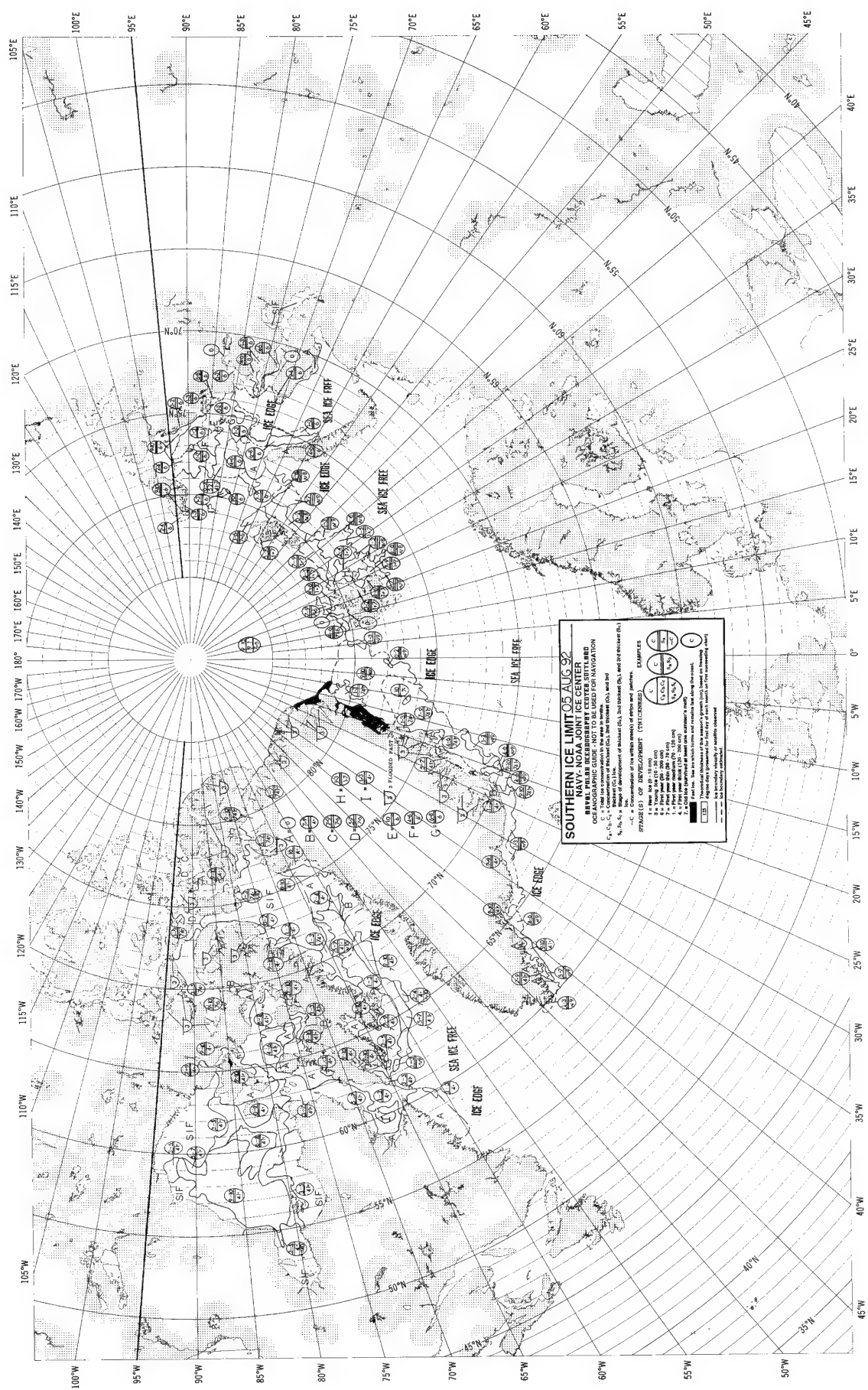
SOUTHERN ICE LIMIT 22 JUL 92
NAVY-NOAA JOINT ICE CENTER
OCEANOGRAPHIC GUIDE SYMBOLS
OCEANOGRAPHIC GUIDE SYMBOLS FOR NAVIGATION

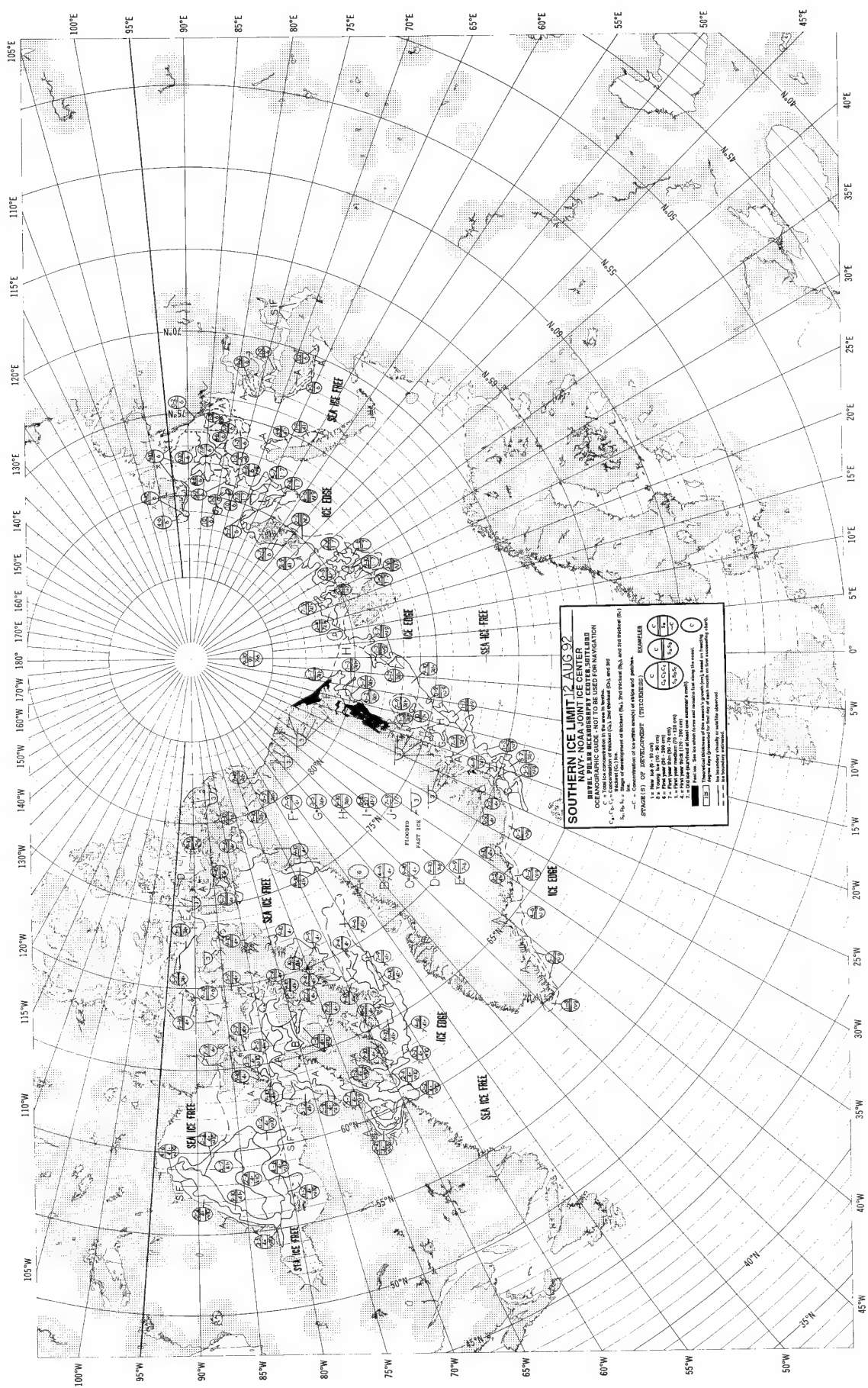
SYMBOLS:
C₁, C₂, C₃ = Concentrations of ice in percent (C₁ and C₂)
S₁, S₂, S₃ = Stages of ice (S₁ and S₂)
A, B, C = Concentrations of ice in percent (A, B, and C)
D, E, F, G = Stages of ice (D, E, F, and G)

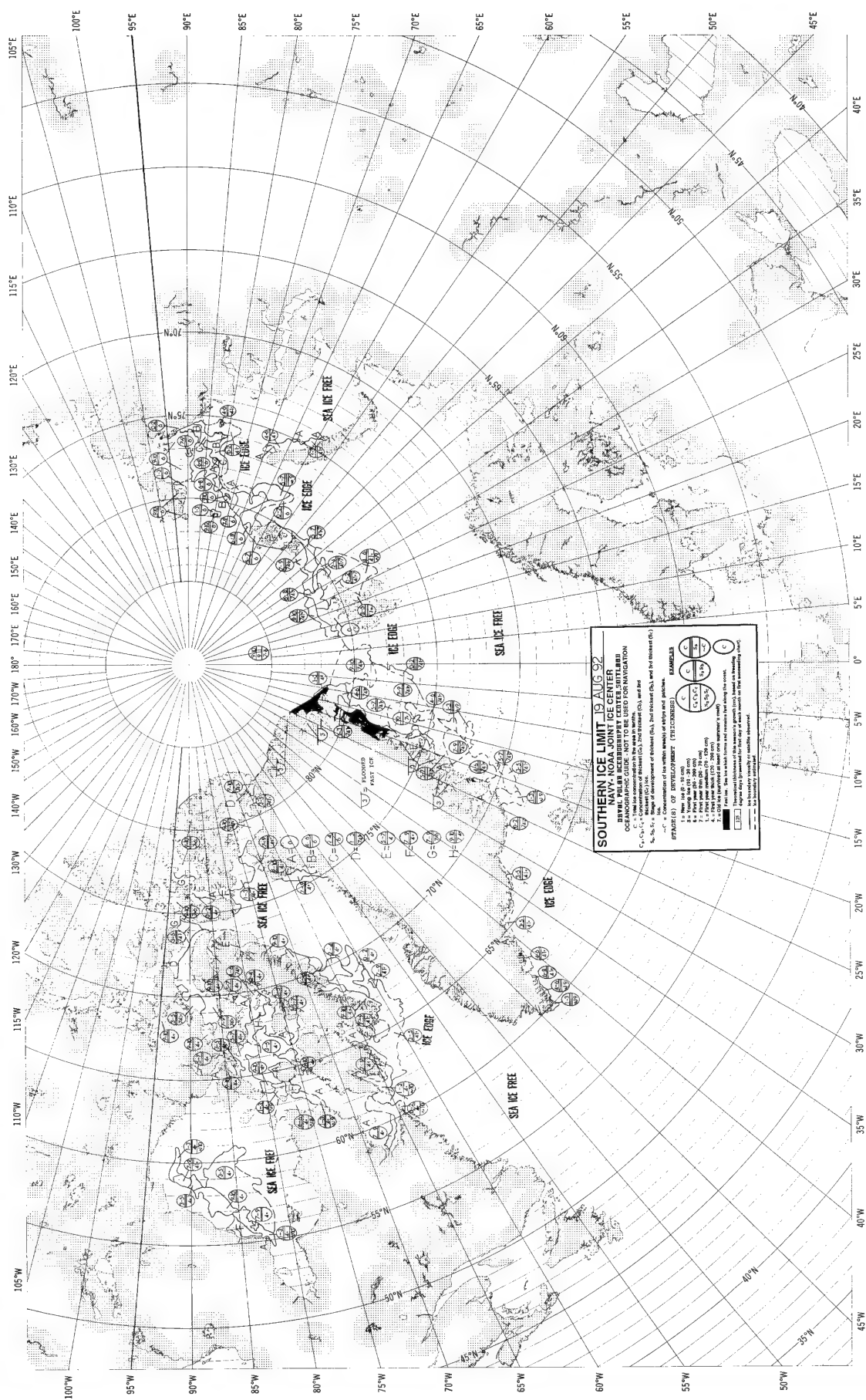
EXAMPLES:
A. 10% ice, 10% ice, 10% ice
B. 10% ice, 10% ice, 10% ice
C. 10% ice, 10% ice, 10% ice
D. 10% ice, 10% ice, 10% ice
E. 10% ice, 10% ice, 10% ice
F. 10% ice, 10% ice, 10% ice
G. 10% ice, 10% ice, 10% ice

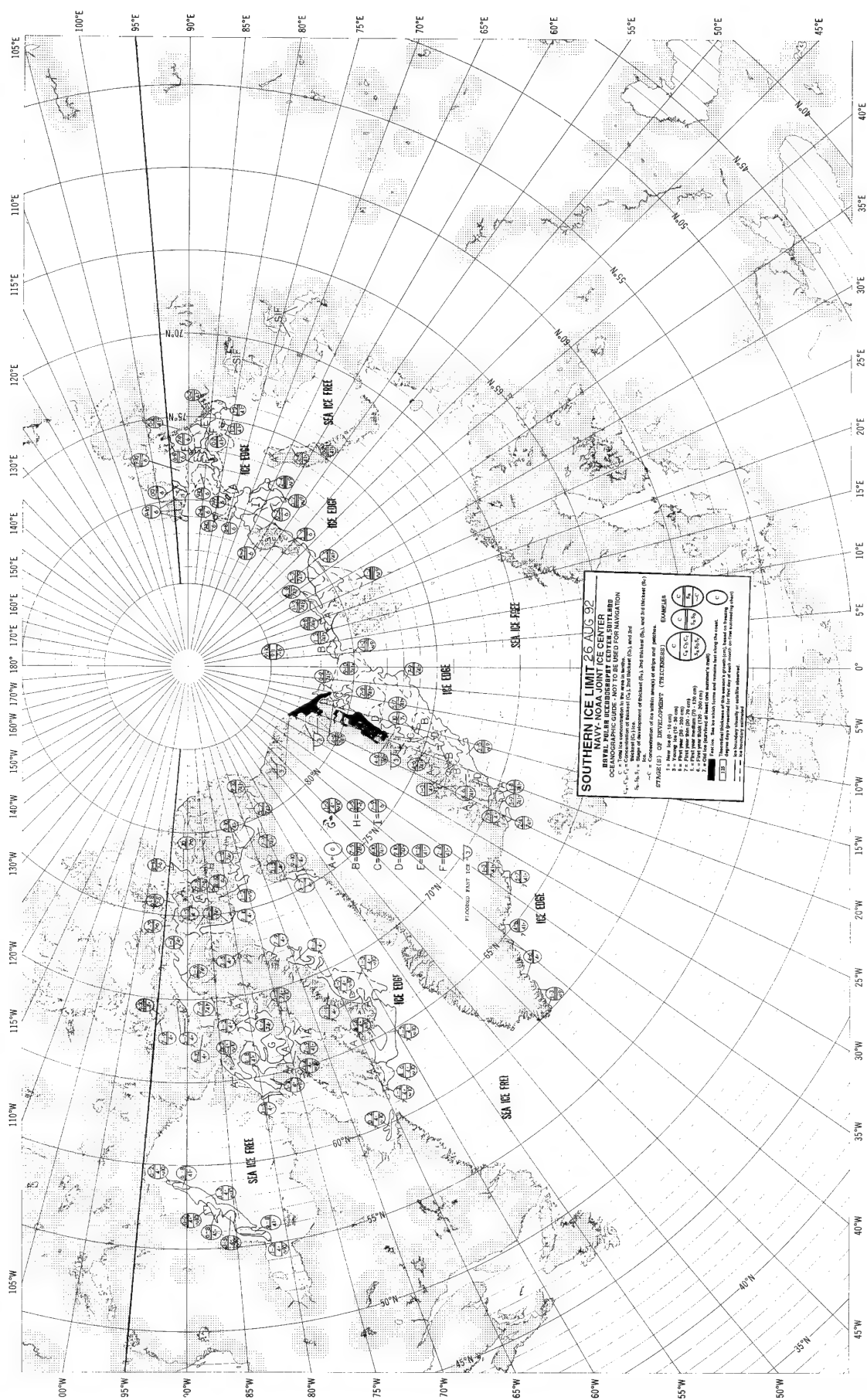
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2. The symbols are used to indicate the concentration of ice in the area.
3. The symbols are used to indicate the stage of ice in the area.
4. The symbols are used to indicate the concentration of ice in the area.

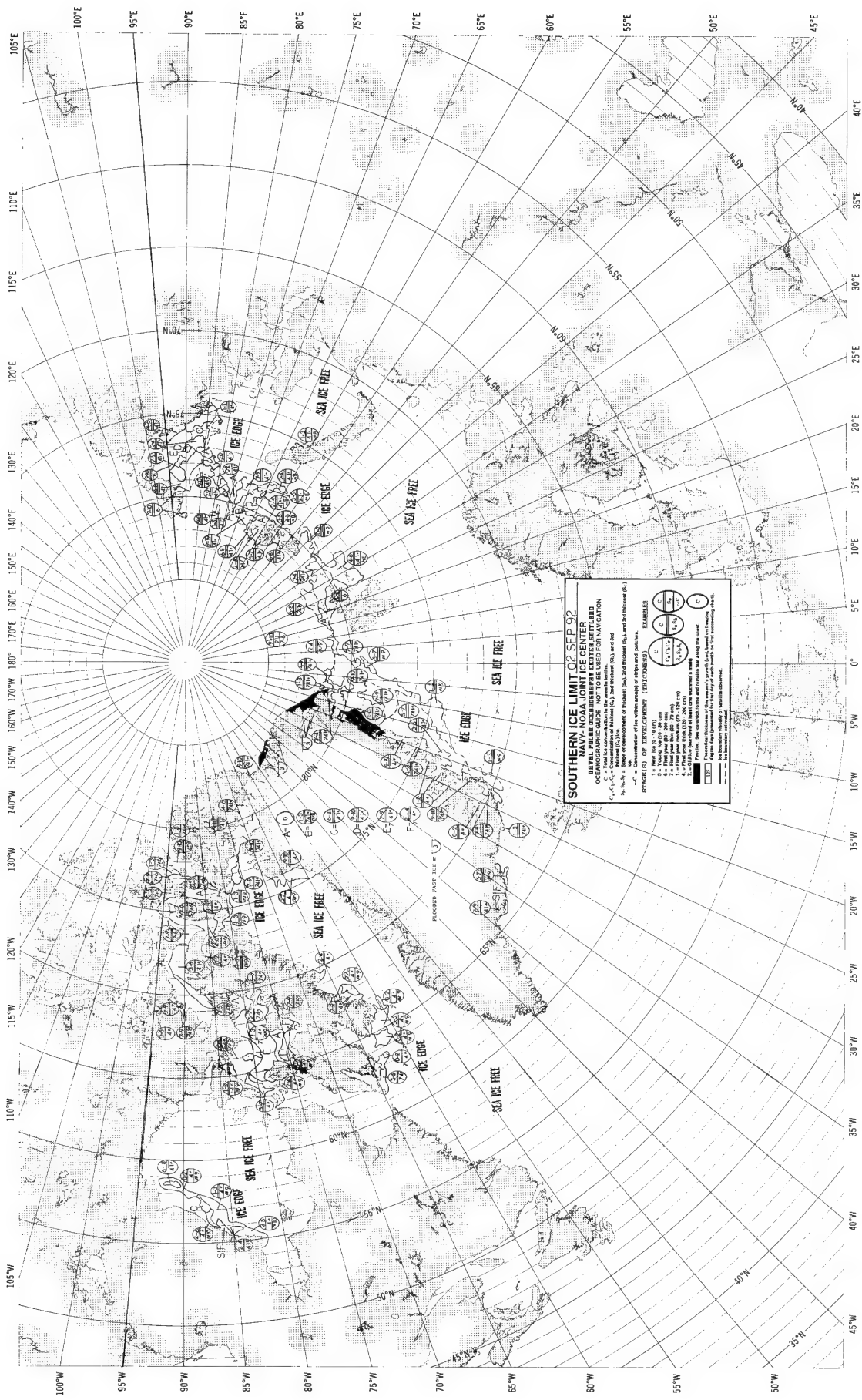


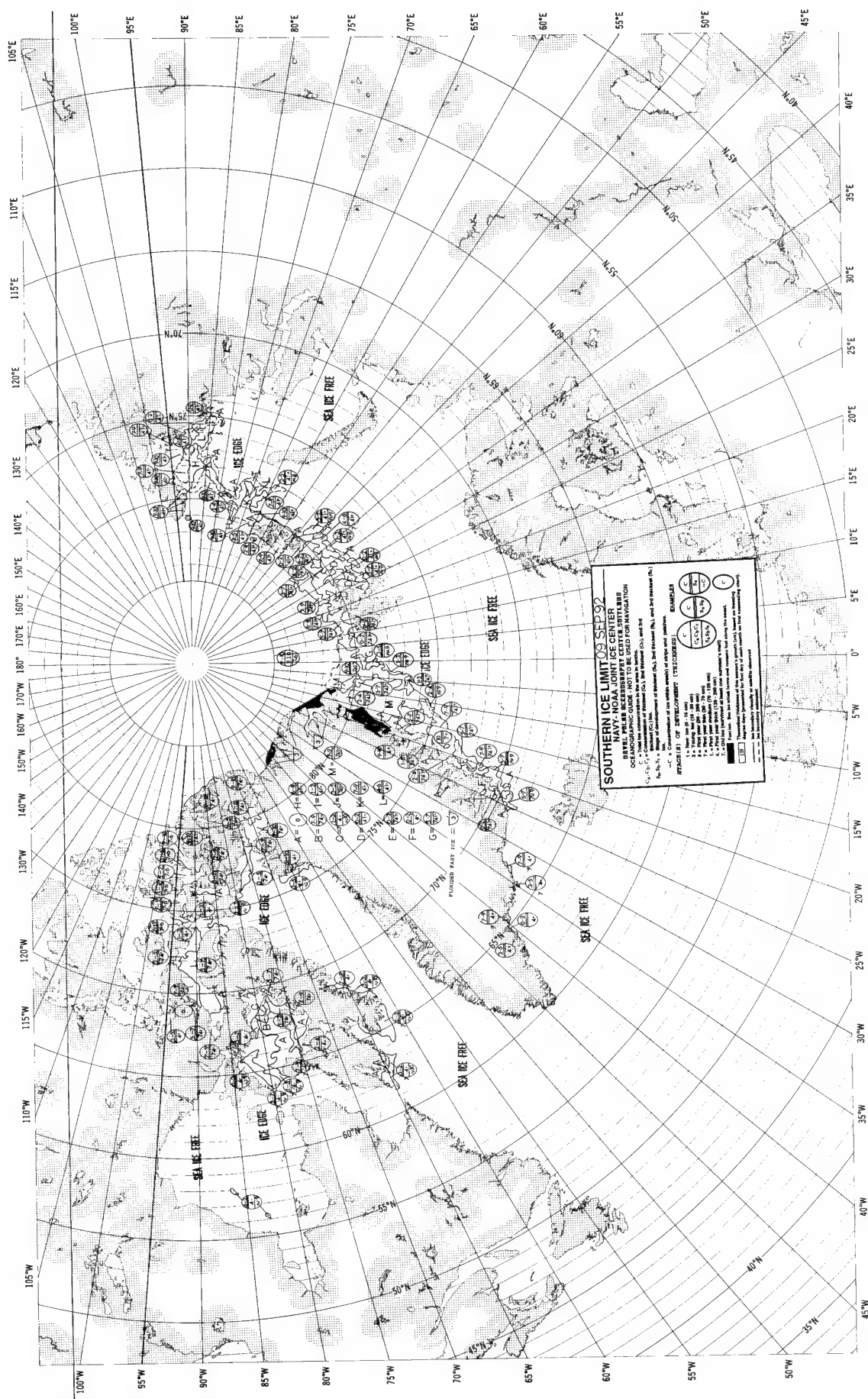


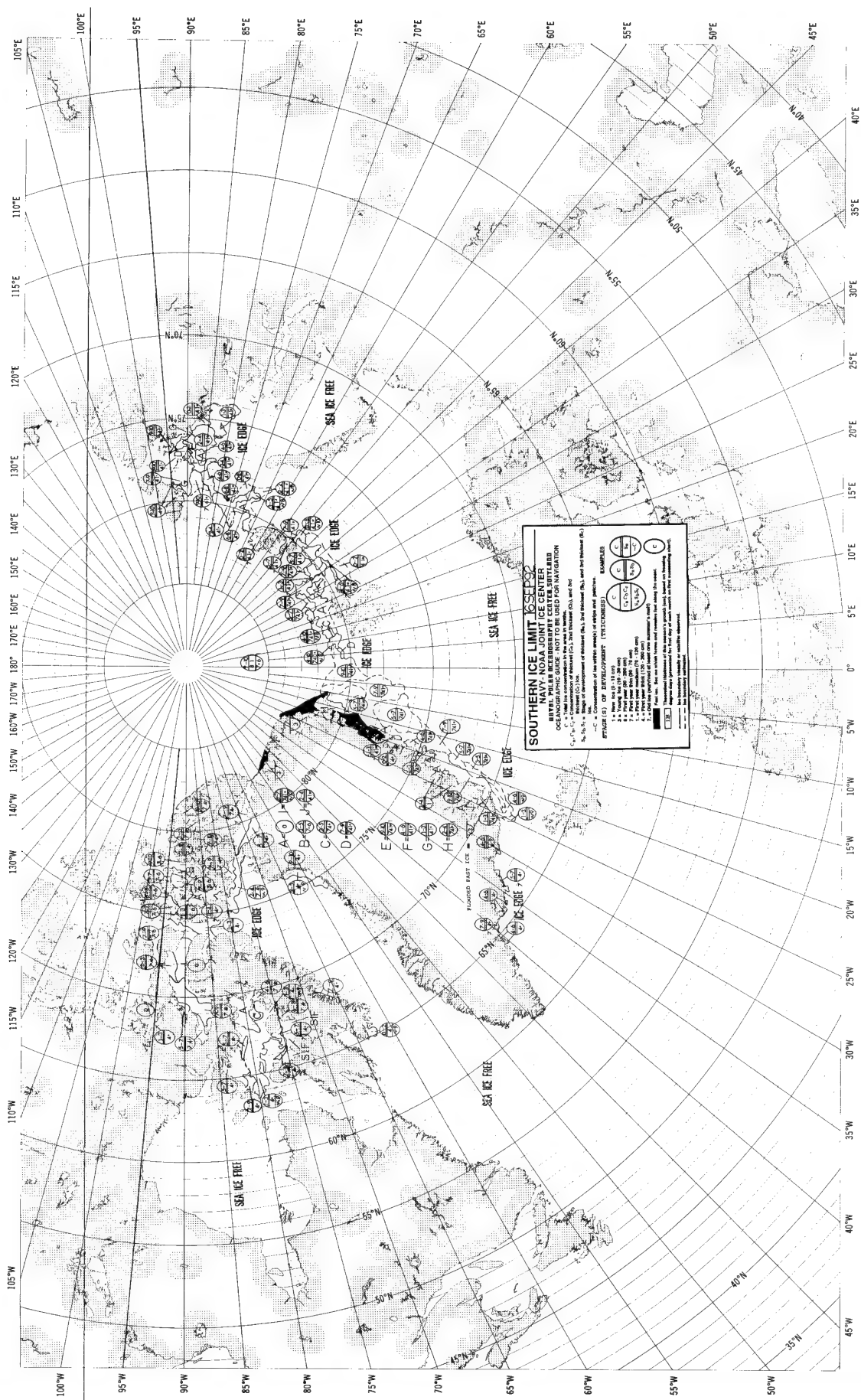


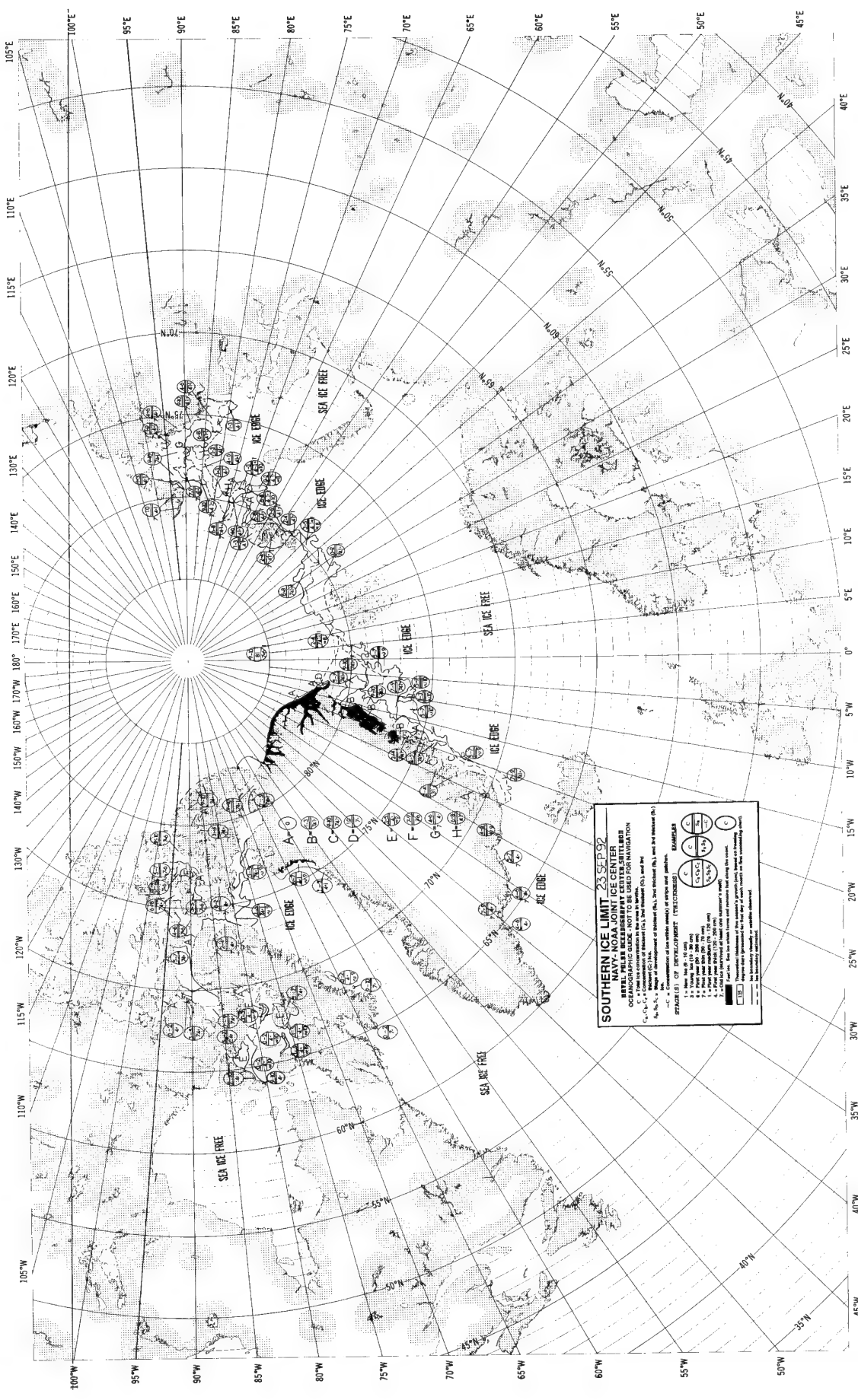








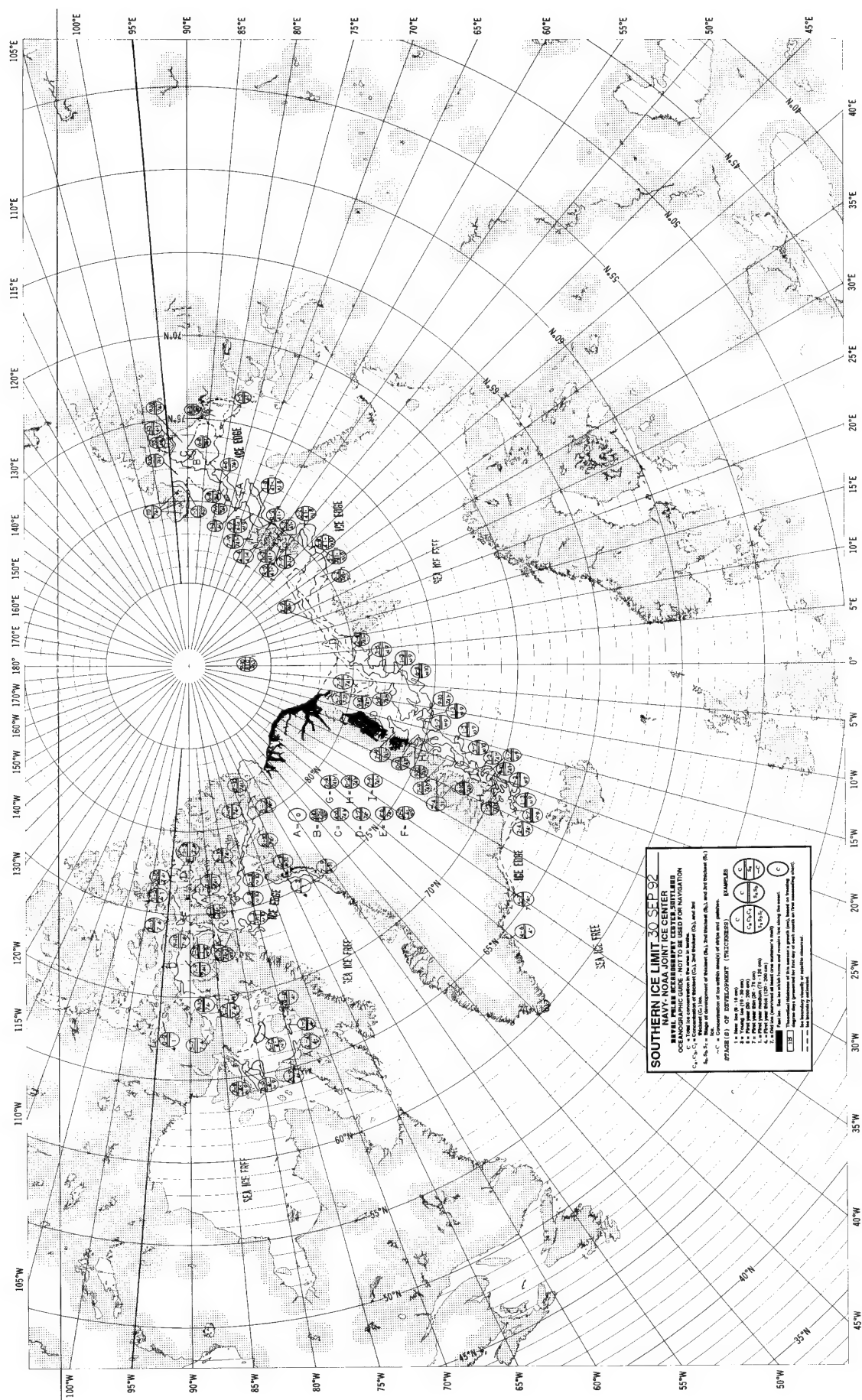


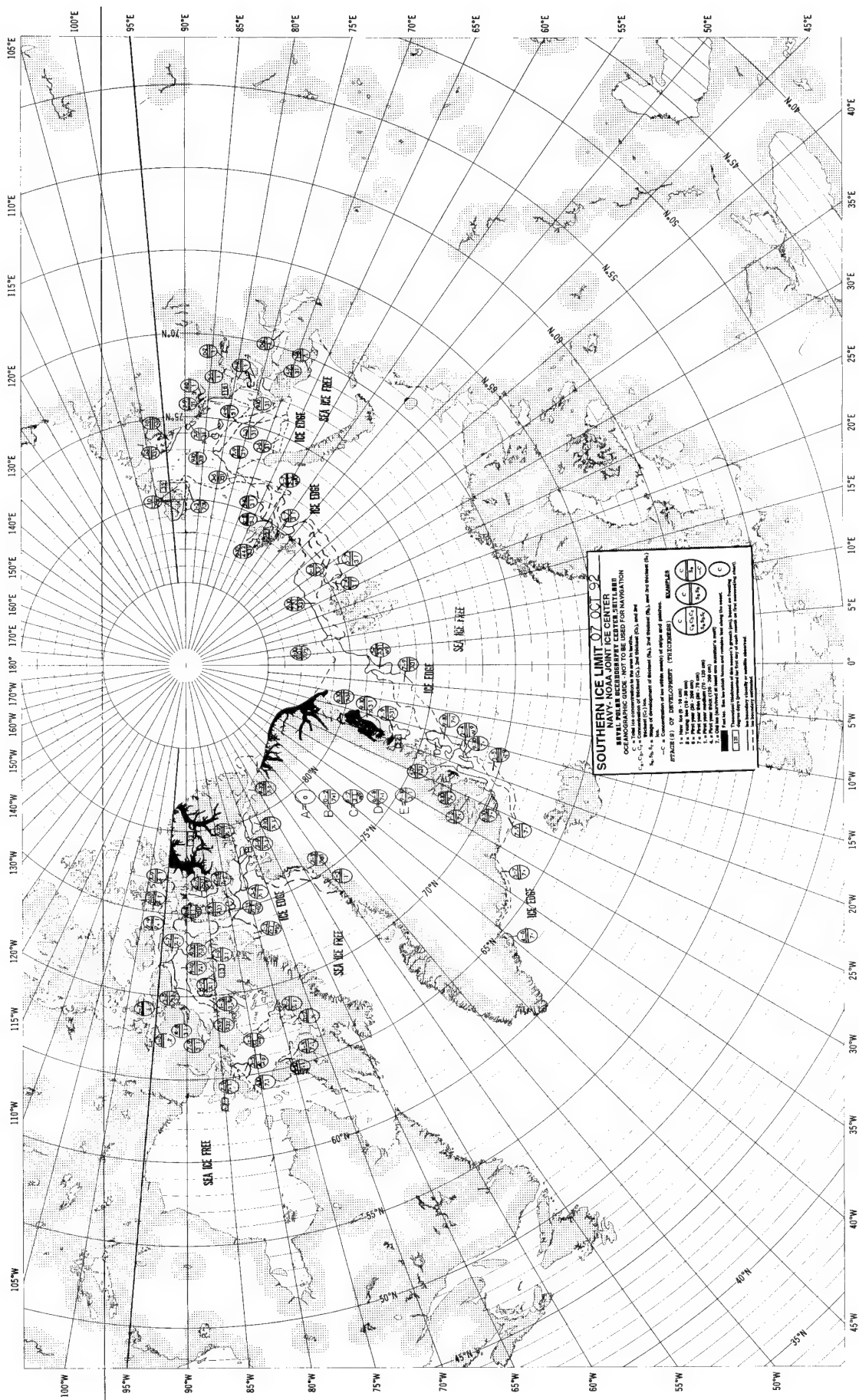


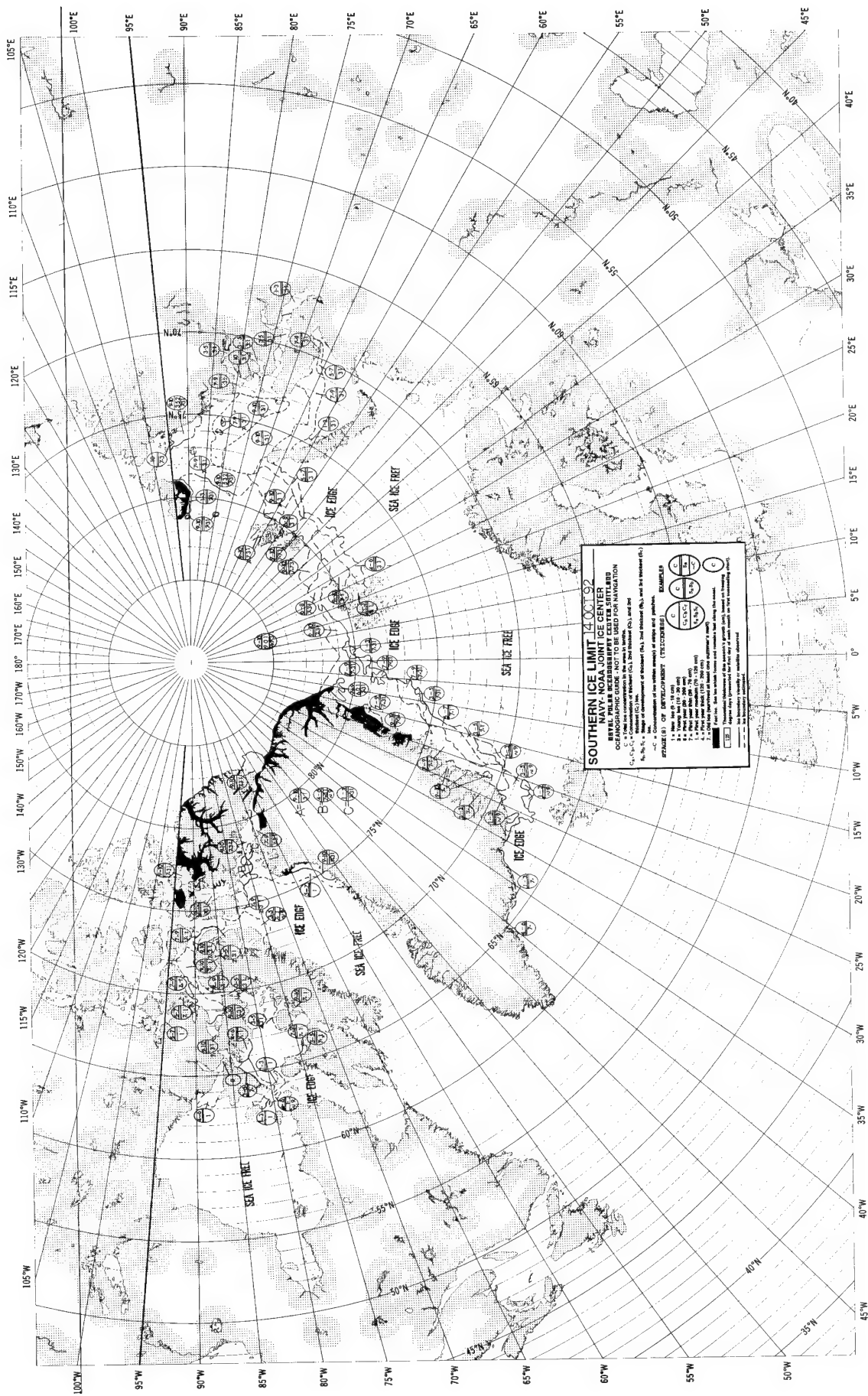
SOUTHERN ICE LIMIT 23 SEP 92
 NAVY-NOAA JOINT ICE CENTER
 1. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 2. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 3. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 4. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 5. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 6. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 7. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 8. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 9. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.
 10. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE NAVY-NOAA JOINT ICE CENTER.

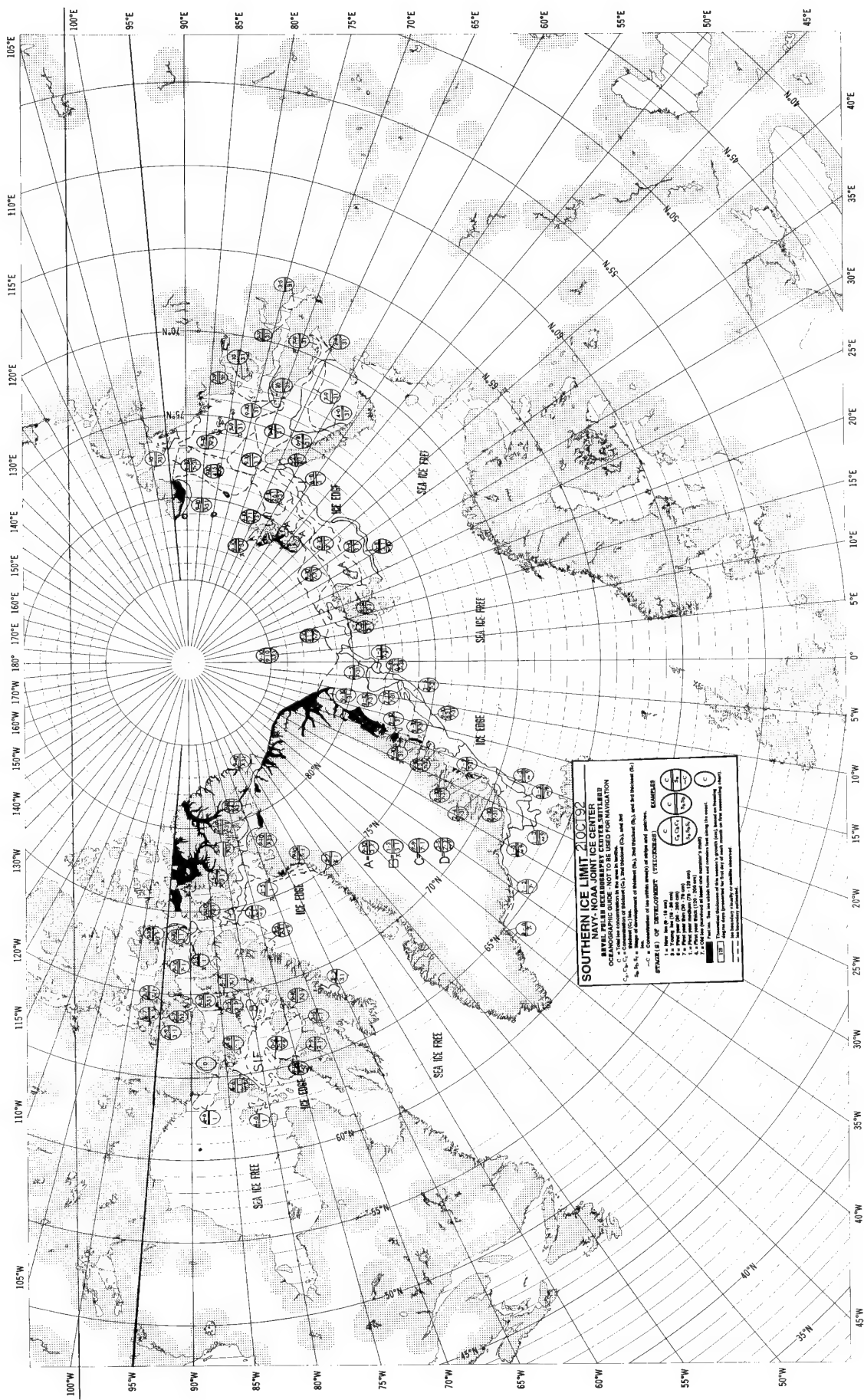
EXAMPLES OF ICE LIMITS (ICE EDGES)

1. 100% Ice	2. 100% Ice	3. 100% Ice	4. 100% Ice
5. 100% Ice	6. 100% Ice	7. 100% Ice	8. 100% Ice
9. 100% Ice	10. 100% Ice	11. 100% Ice	12. 100% Ice
13. 100% Ice	14. 100% Ice	15. 100% Ice	16. 100% Ice
17. 100% Ice	18. 100% Ice	19. 100% Ice	20. 100% Ice
21. 100% Ice	22. 100% Ice	23. 100% Ice	24. 100% Ice
25. 100% Ice	26. 100% Ice	27. 100% Ice	28. 100% Ice
29. 100% Ice	30. 100% Ice	31. 100% Ice	32. 100% Ice
33. 100% Ice	34. 100% Ice	35. 100% Ice	36. 100% Ice
37. 100% Ice	38. 100% Ice	39. 100% Ice	40. 100% Ice
41. 100% Ice	42. 100% Ice	43. 100% Ice	44. 100% Ice
45. 100% Ice	46. 100% Ice	47. 100% Ice	48. 100% Ice
49. 100% Ice	50. 100% Ice	51. 100% Ice	52. 100% Ice
53. 100% Ice	54. 100% Ice	55. 100% Ice	56. 100% Ice
57. 100% Ice	58. 100% Ice	59. 100% Ice	60. 100% Ice
61. 100% Ice	62. 100% Ice	63. 100% Ice	64. 100% Ice
65. 100% Ice	66. 100% Ice	67. 100% Ice	68. 100% Ice
69. 100% Ice	70. 100% Ice	71. 100% Ice	72. 100% Ice
73. 100% Ice	74. 100% Ice	75. 100% Ice	76. 100% Ice
77. 100% Ice	78. 100% Ice	79. 100% Ice	80. 100% Ice
81. 100% Ice	82. 100% Ice	83. 100% Ice	84. 100% Ice
85. 100% Ice	86. 100% Ice	87. 100% Ice	88. 100% Ice
89. 100% Ice	90. 100% Ice	91. 100% Ice	92. 100% Ice
93. 100% Ice	94. 100% Ice	95. 100% Ice	96. 100% Ice
97. 100% Ice	98. 100% Ice	99. 100% Ice	100. 100% Ice









SOUTHERN ICE LIMIT 2001
ANTARCTIC JOINT ICE CENTER
NAVY PLS RESEARCH CENTER OUTLET
OCEANOGRAPHIC GUIDE FOR NAVIGATION

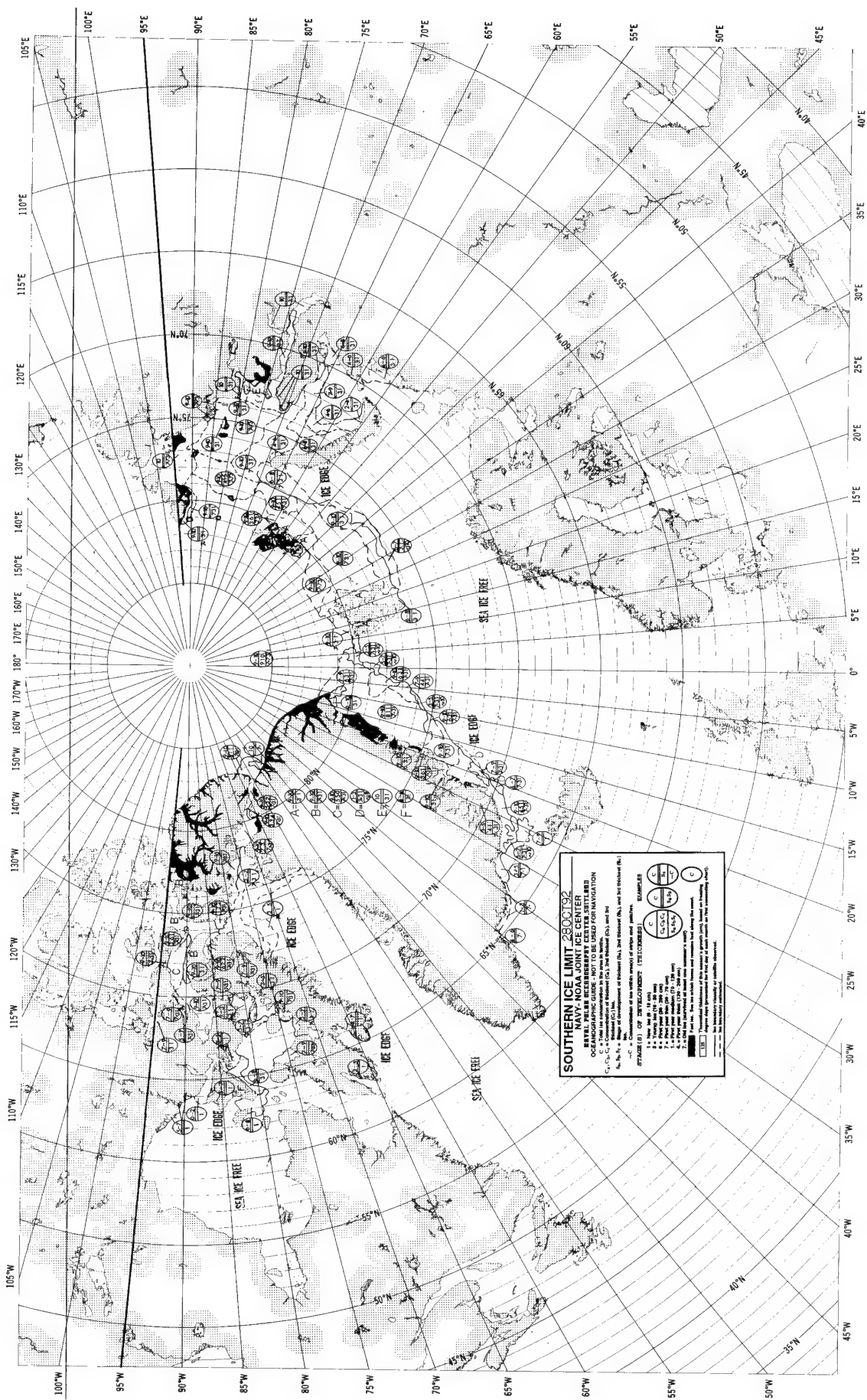
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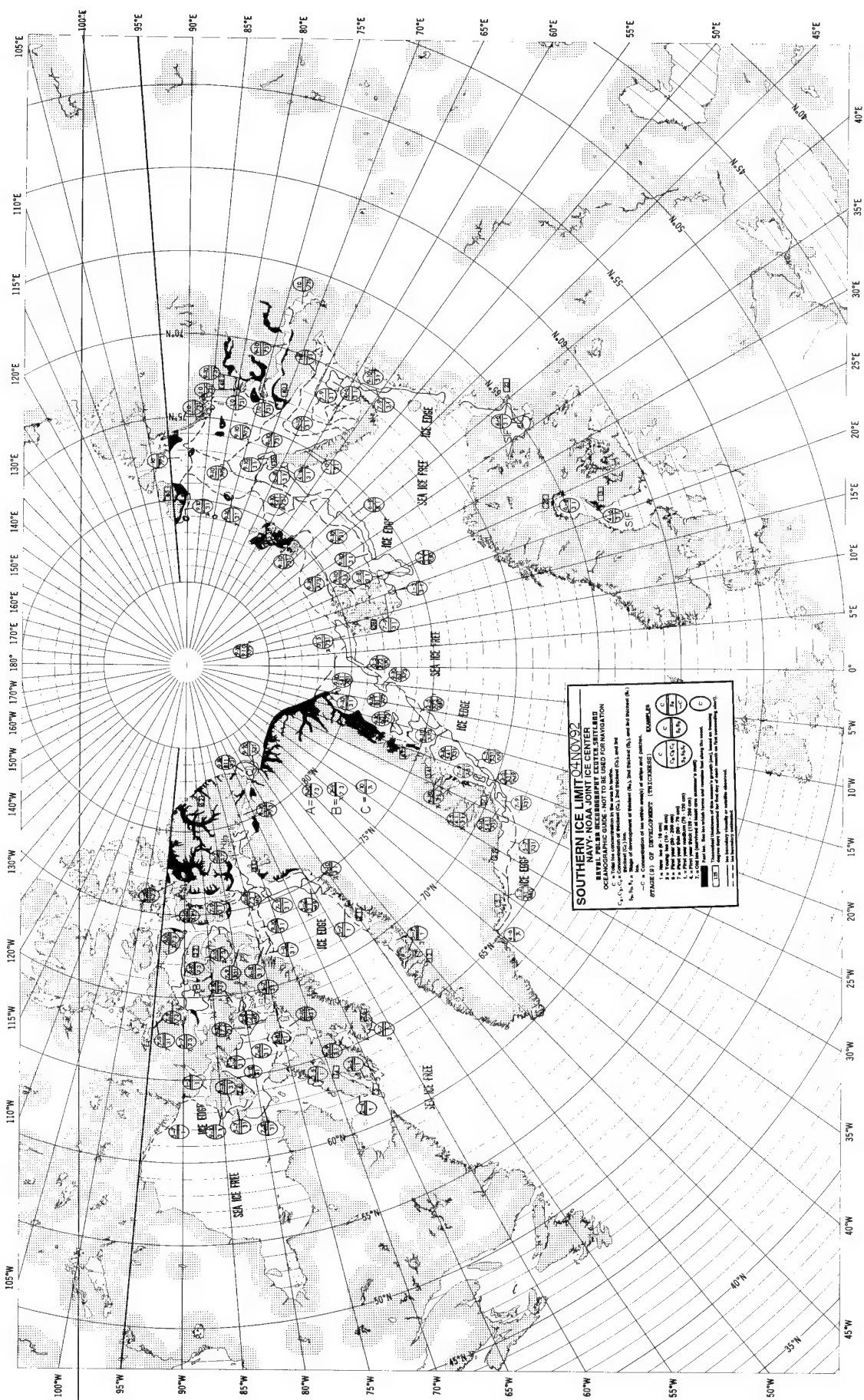
- 1-4** Ice Limit (1-4 m)
- 5-8** Ice Limit (5-8 m)
- 9-12** Ice Limit (9-12 m)
- 13-16** Ice Limit (13-16 m)
- 17-20** Ice Limit (17-20 m)
- 21-24** Ice Limit (21-24 m)
- 25-28** Ice Limit (25-28 m)
- 29-32** Ice Limit (29-32 m)
- 33-36** Ice Limit (33-36 m)
- 37-40** Ice Limit (37-40 m)
- 41-44** Ice Limit (41-44 m)
- 45-48** Ice Limit (45-48 m)
- 49-52** Ice Limit (49-52 m)
- 53-56** Ice Limit (53-56 m)
- 57-60** Ice Limit (57-60 m)
- 61-64** Ice Limit (61-64 m)
- 65-68** Ice Limit (65-68 m)
- 69-72** Ice Limit (69-72 m)
- 73-76** Ice Limit (73-76 m)
- 77-80** Ice Limit (77-80 m)
- 81-84** Ice Limit (81-84 m)
- 85-88** Ice Limit (85-88 m)
- 89-92** Ice Limit (89-92 m)
- 93-96** Ice Limit (93-96 m)
- 97-100** Ice Limit (97-100 m)

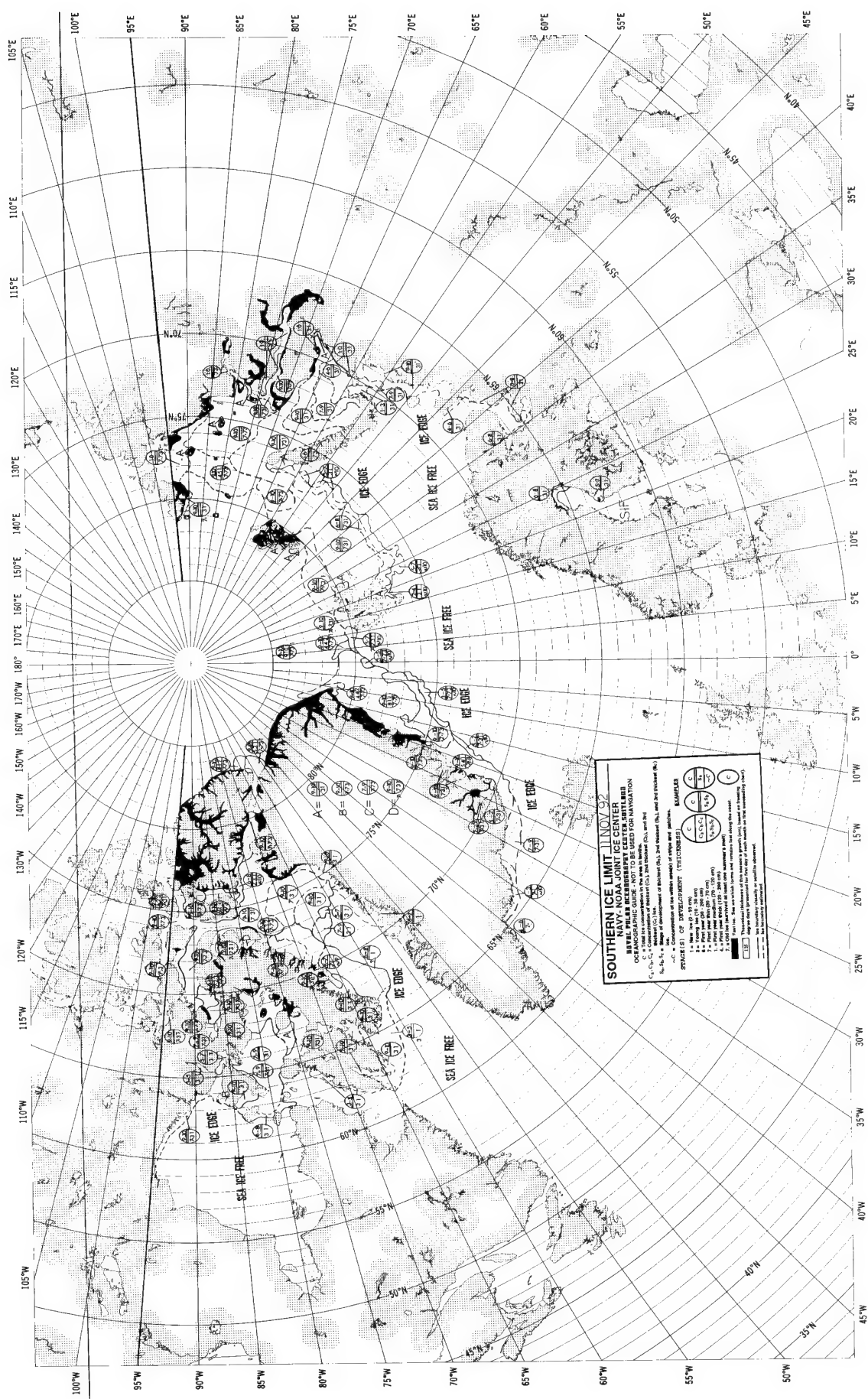
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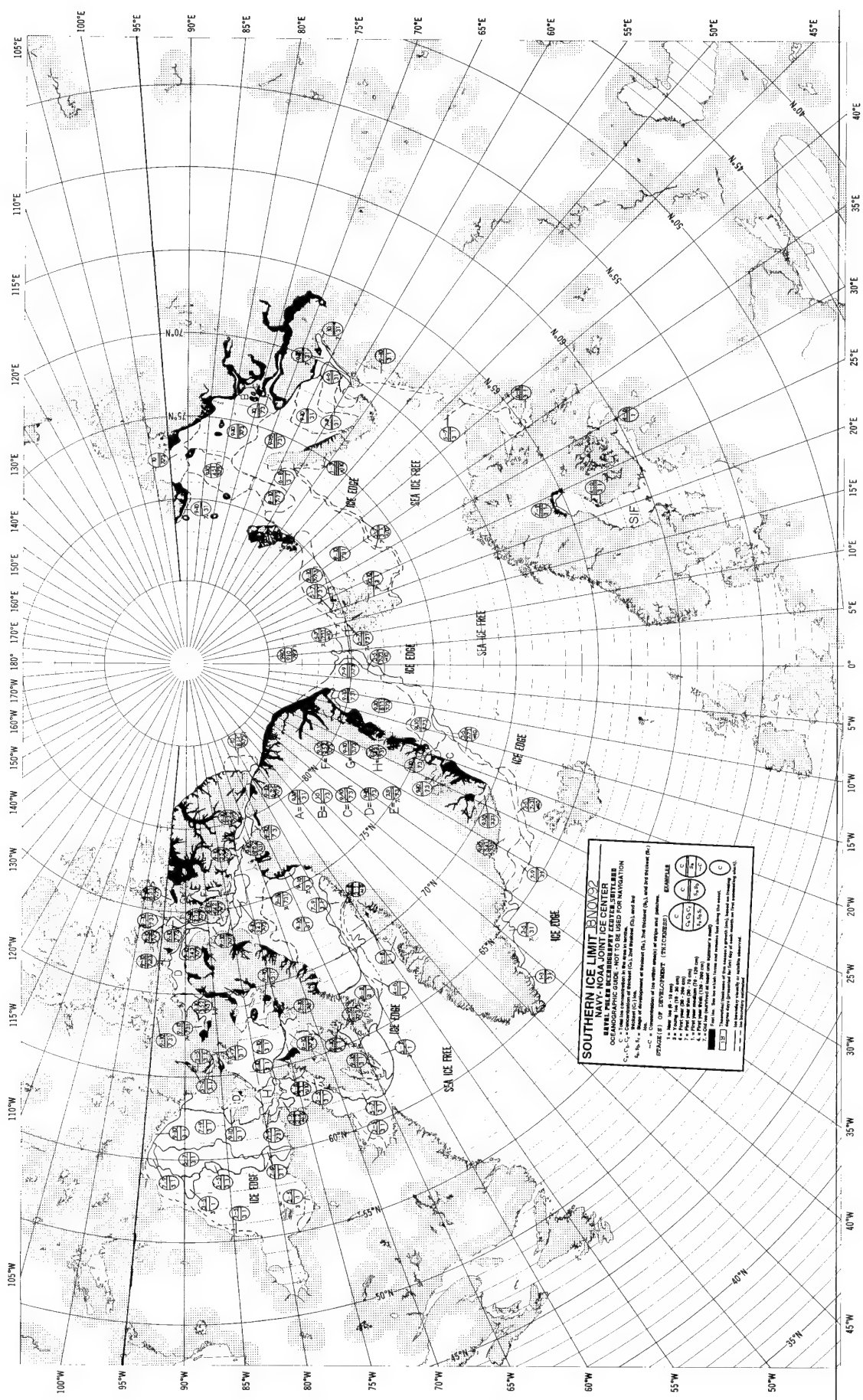
Notes:

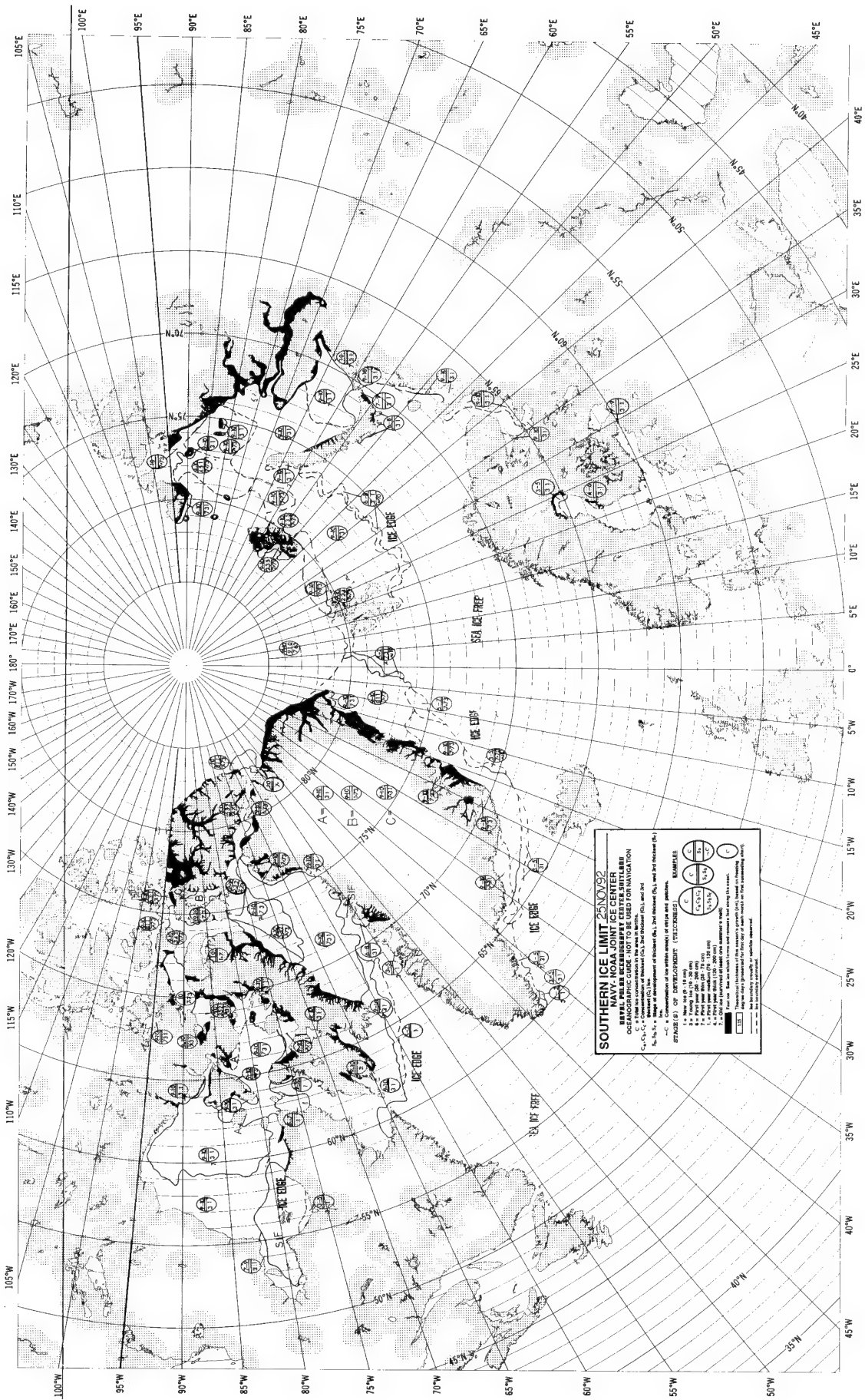
- 1. Ice Limit (1-4 m)
- 2. Ice Limit (5-8 m)
- 3. Ice Limit (9-12 m)
- 4. Ice Limit (13-16 m)
- 5. Ice Limit (17-20 m)
- 6. Ice Limit (21-24 m)
- 7. Ice Limit (25-28 m)
- 8. Ice Limit (29-32 m)
- 9. Ice Limit (33-36 m)
- 10. Ice Limit (37-40 m)
- 11. Ice Limit (41-44 m)
- 12. Ice Limit (45-48 m)
- 13. Ice Limit (49-52 m)
- 14. Ice Limit (53-56 m)
- 15. Ice Limit (57-60 m)
- 16. Ice Limit (61-64 m)
- 17. Ice Limit (65-68 m)
- 18. Ice Limit (69-72 m)
- 19. Ice Limit (73-76 m)
- 20. Ice Limit (77-80 m)
- 21. Ice Limit (81-84 m)
- 22. Ice Limit (85-88 m)
- 23. Ice Limit (89-92 m)
- 24. Ice Limit (93-96 m)
- 25. Ice Limit (97-100 m)

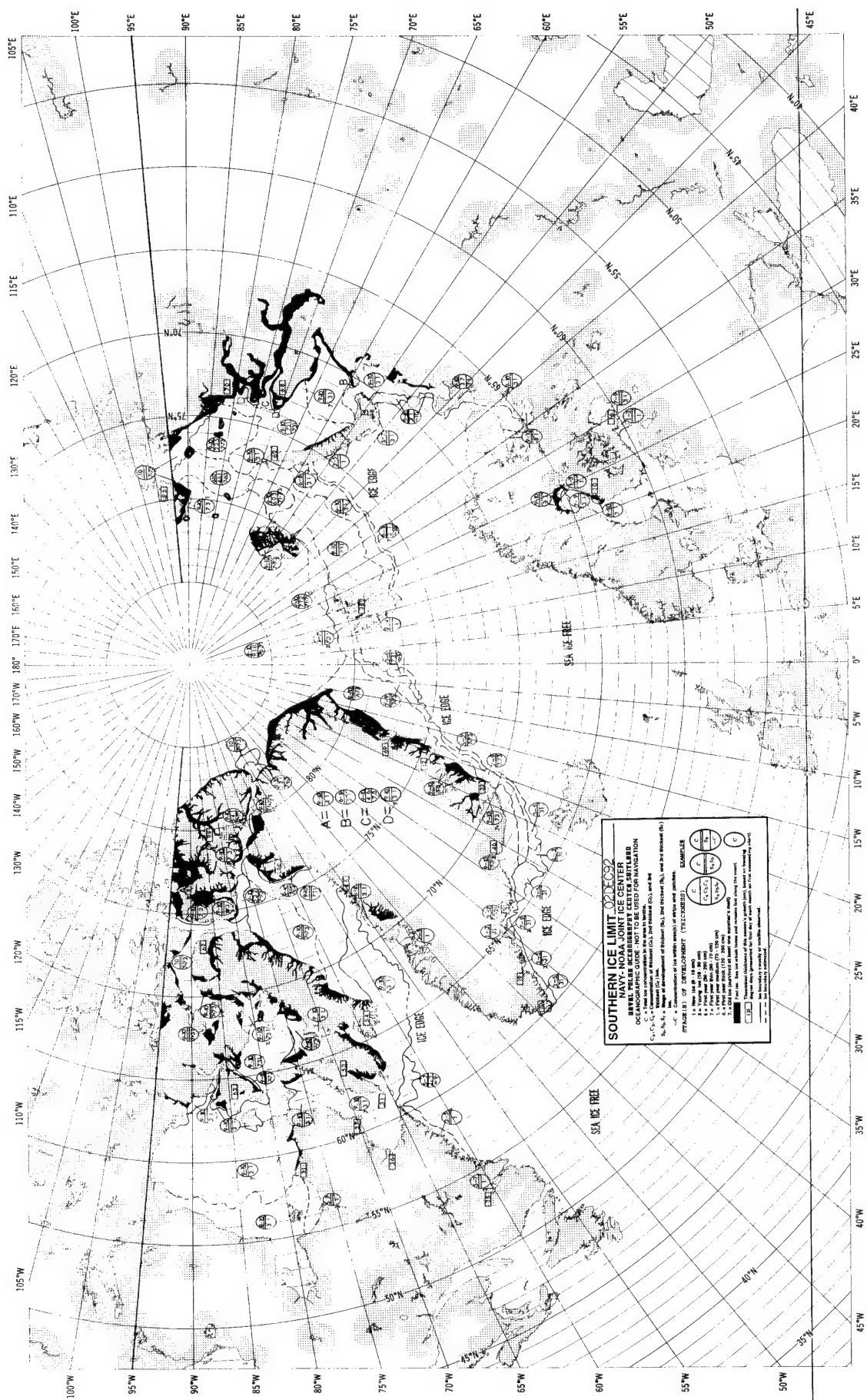


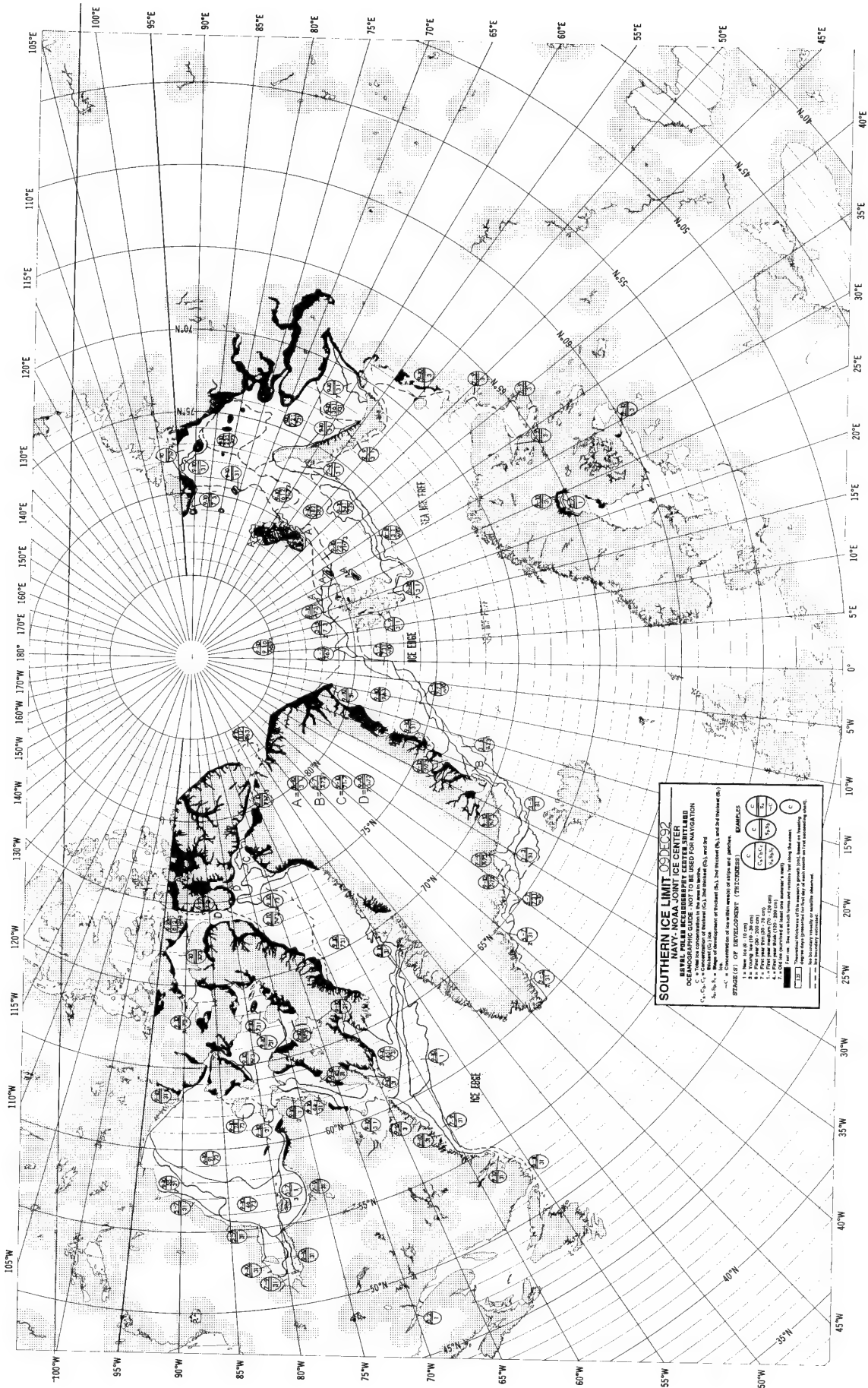












SOUTHERN ICE LIMIT 051009Z
 DEPARTMENT OF THE NAVY
 NAVY POLAR RESEARCH CENTER
 OCEANOGRAPHIC GUIDE - NOT TO BE USED FOR NAVIGATION

C_1, C_2, C_3 = Concentration of Ice (%), Ice Thickness (ft), and Ice Age (yr)
 S_1, S_2, S_3 = Range of development of Ice (%), Ice Thickness (ft), and Ice Age (yr)

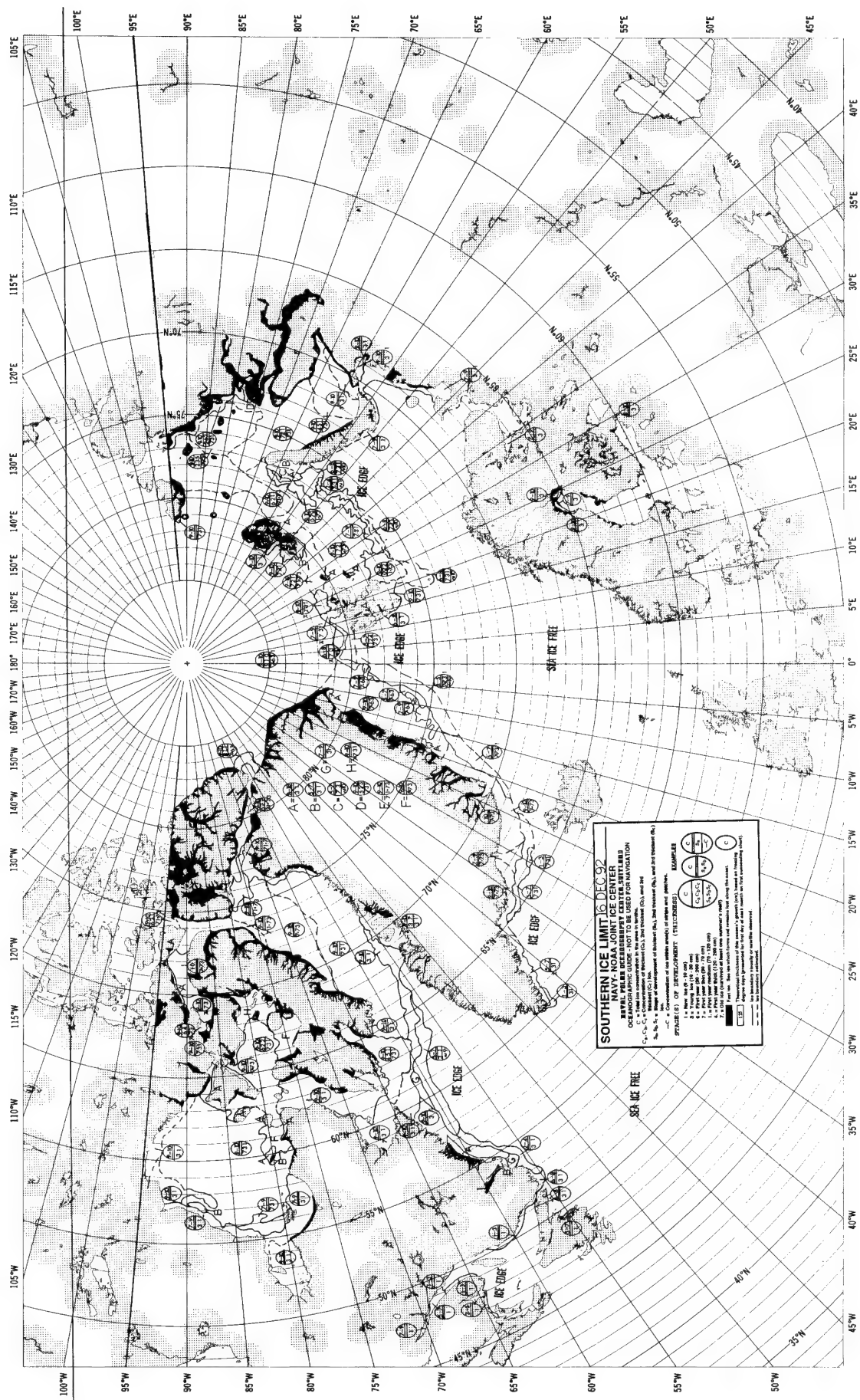
SYMBOLS

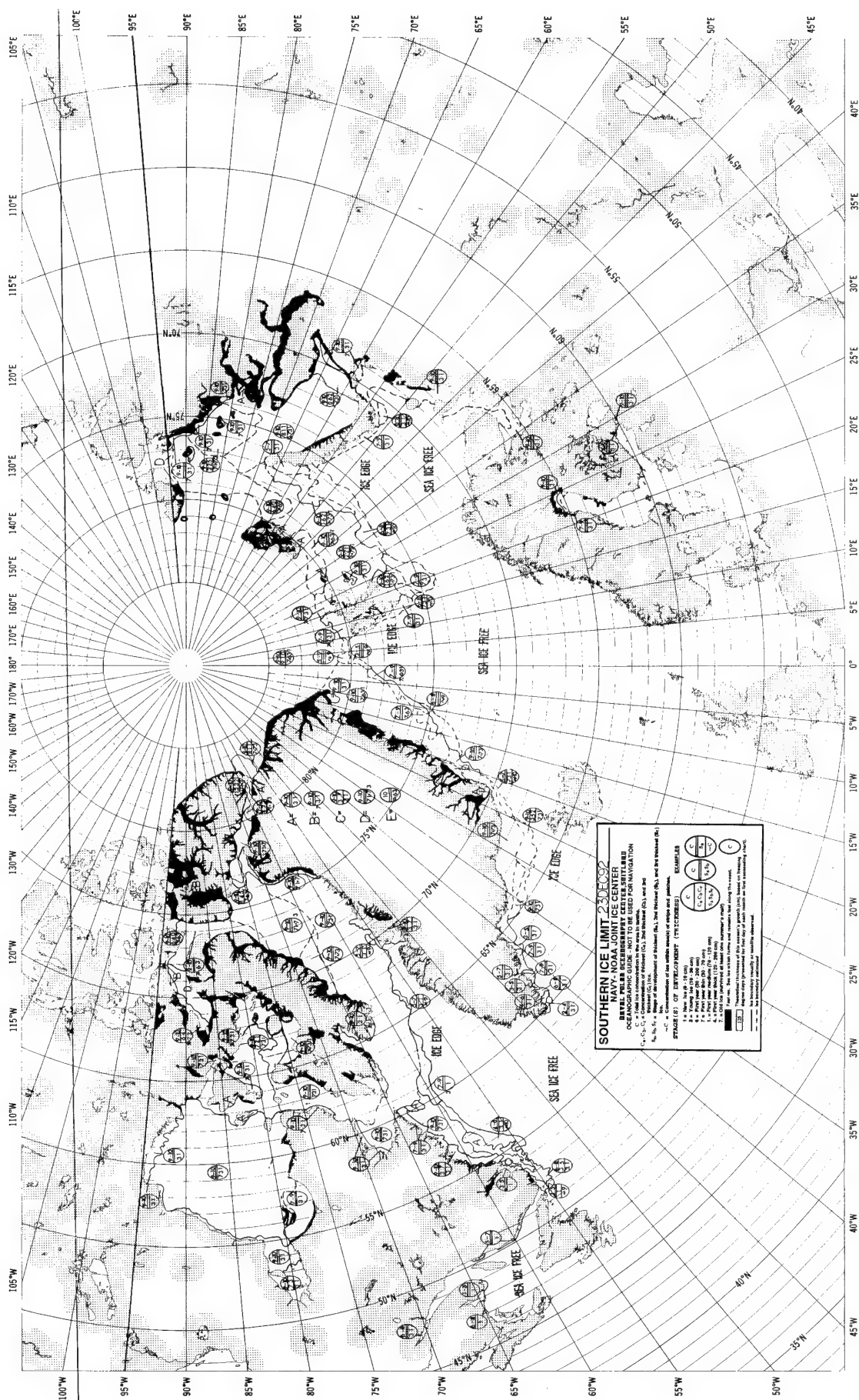
- 1. A = New Ice (0-100%)
- 2. B = Young Ice (10-100%)
- 3. C = Old Ice (10-100%)
- 4. D = Ice Edge (10-100%)
- 5. 1 = Ice Limit (10-100%)
- 6. 2 = Ice Limit (10-100%)
- 7. 3 = Ice Limit (10-100%)

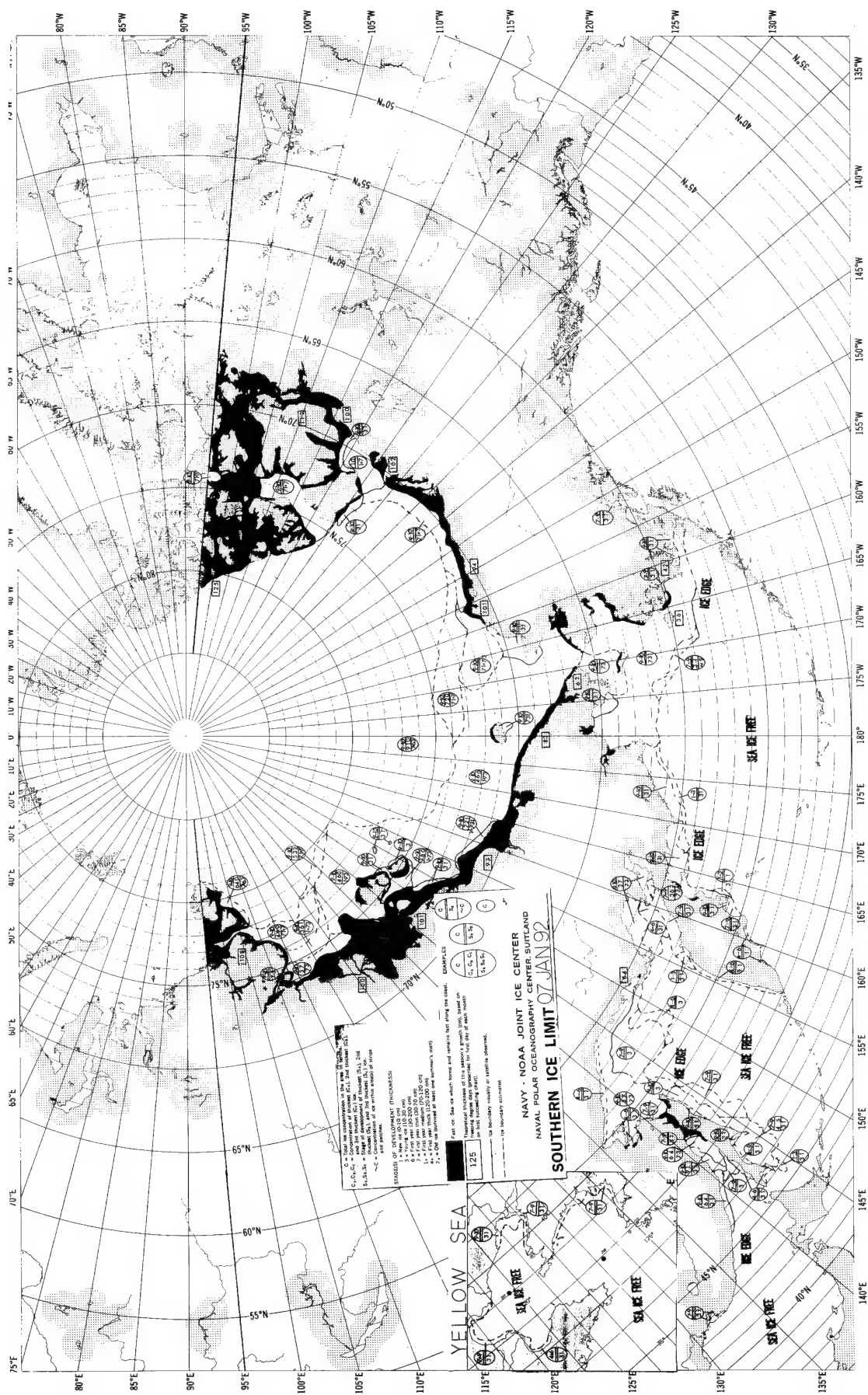
EXAMPLES

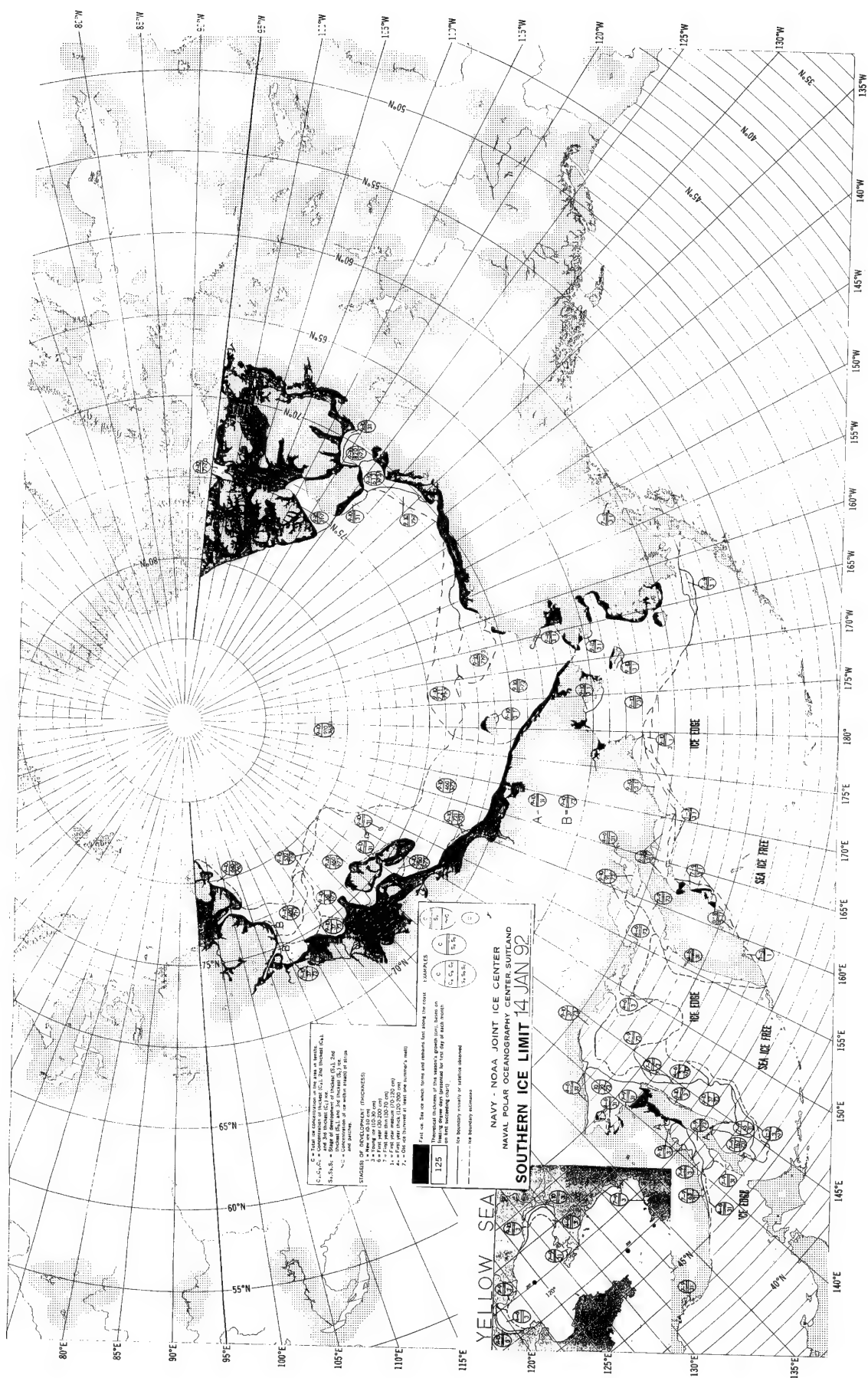
A	B	C	D
1	2	3	4
5	6	7	

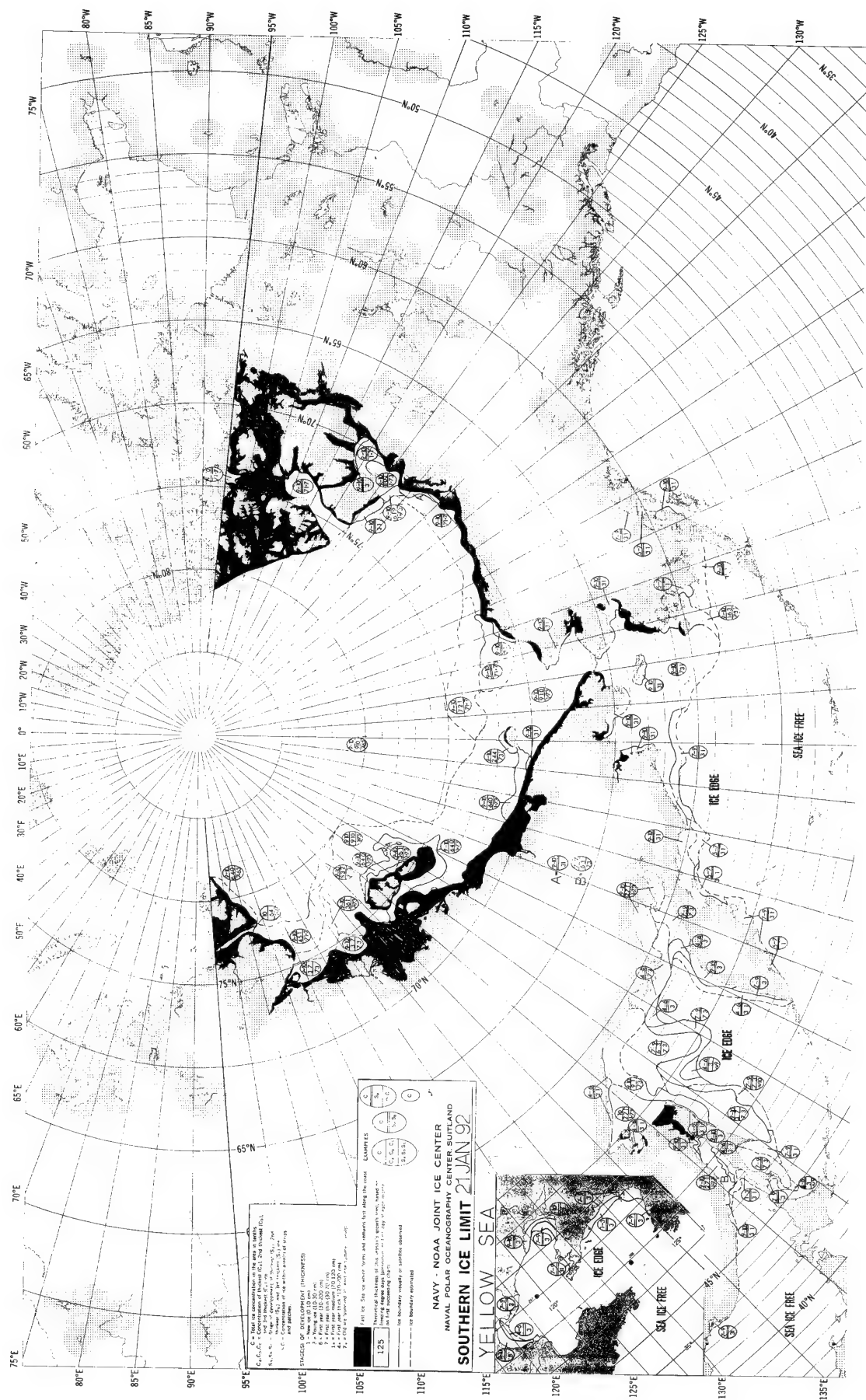
Notes: 1. Ice Limit (10-100%) is the outermost limit of ice. 2. Ice Limit (10-100%) is the outermost limit of ice. 3. Ice Limit (10-100%) is the outermost limit of ice.

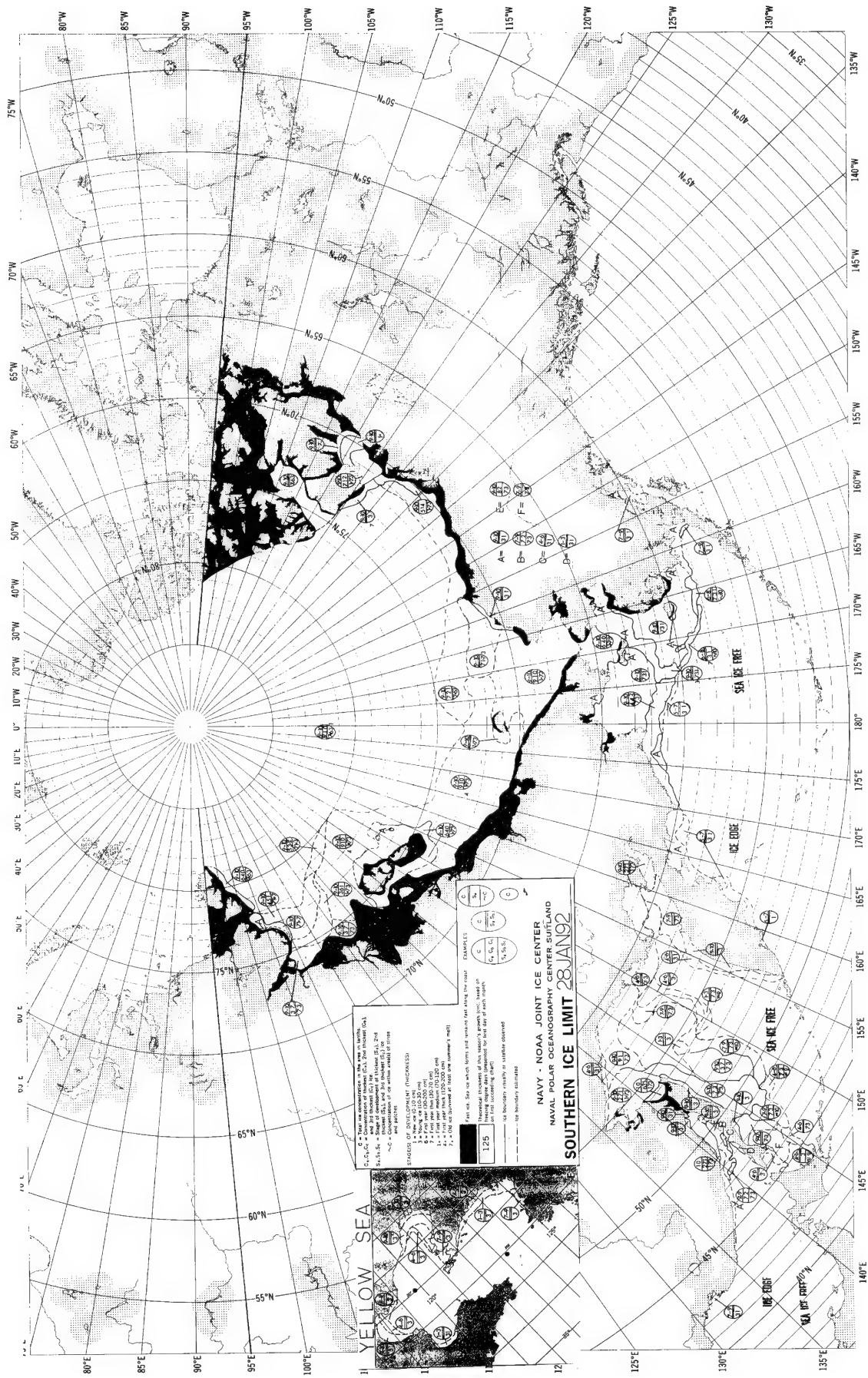


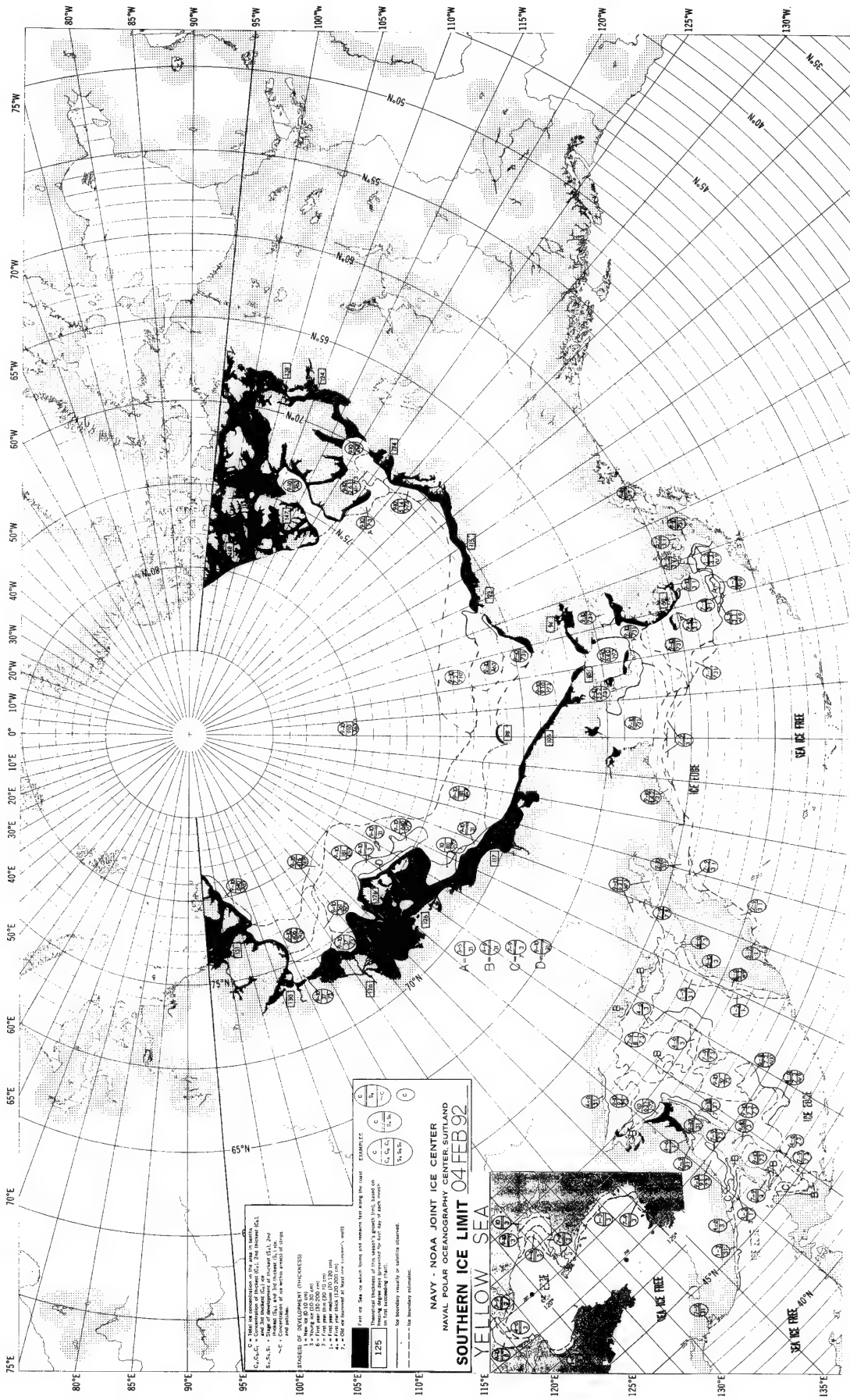


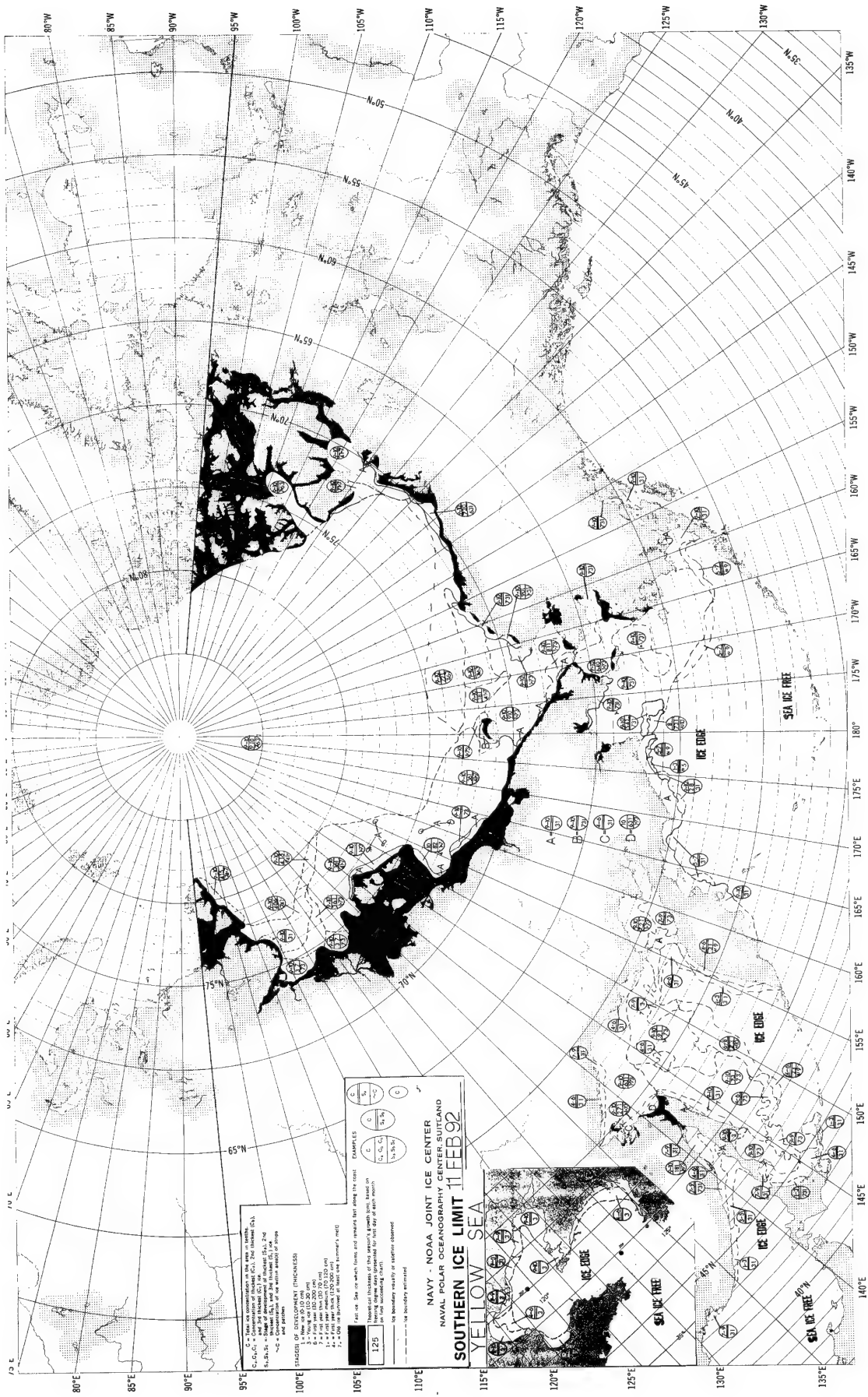


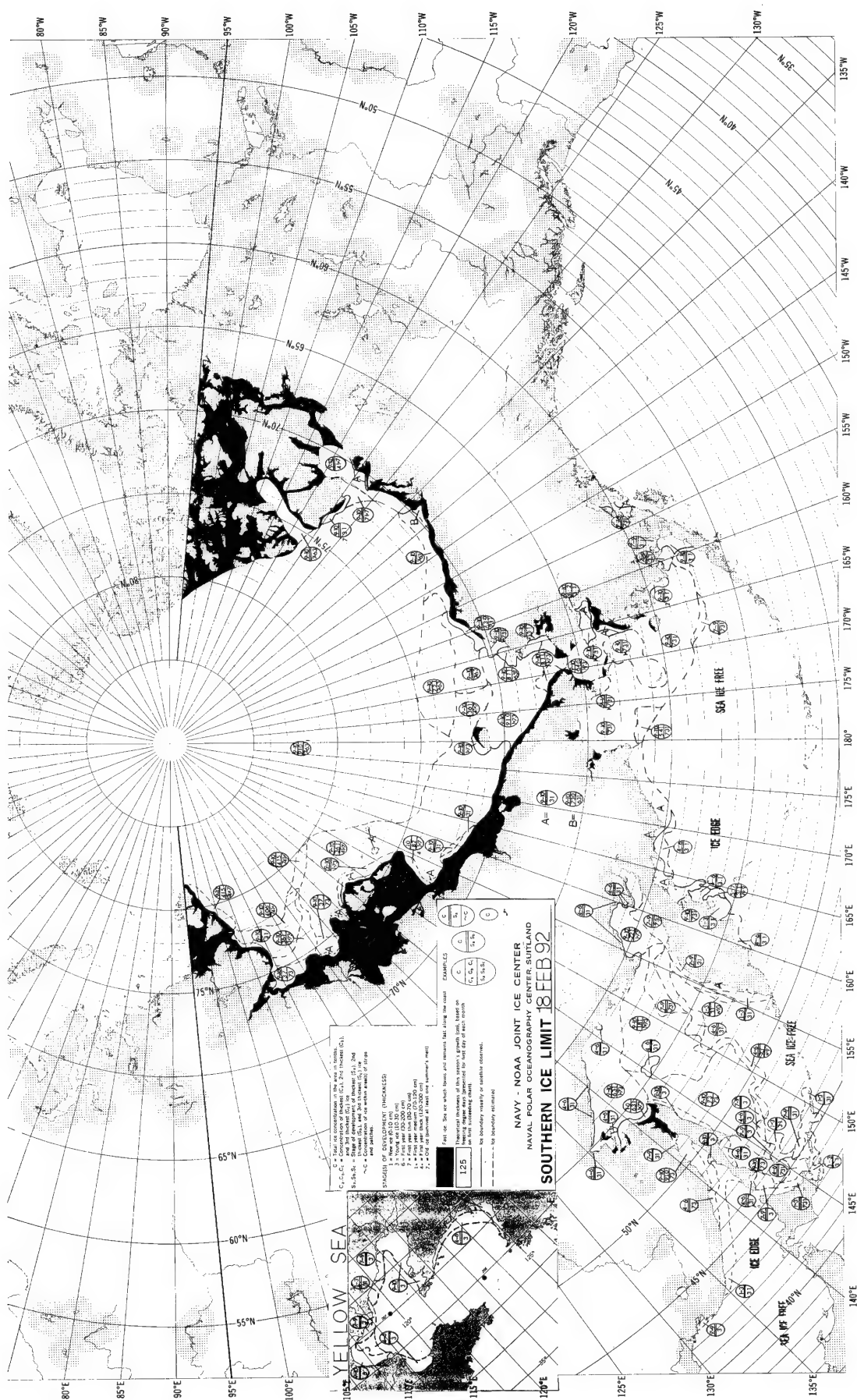


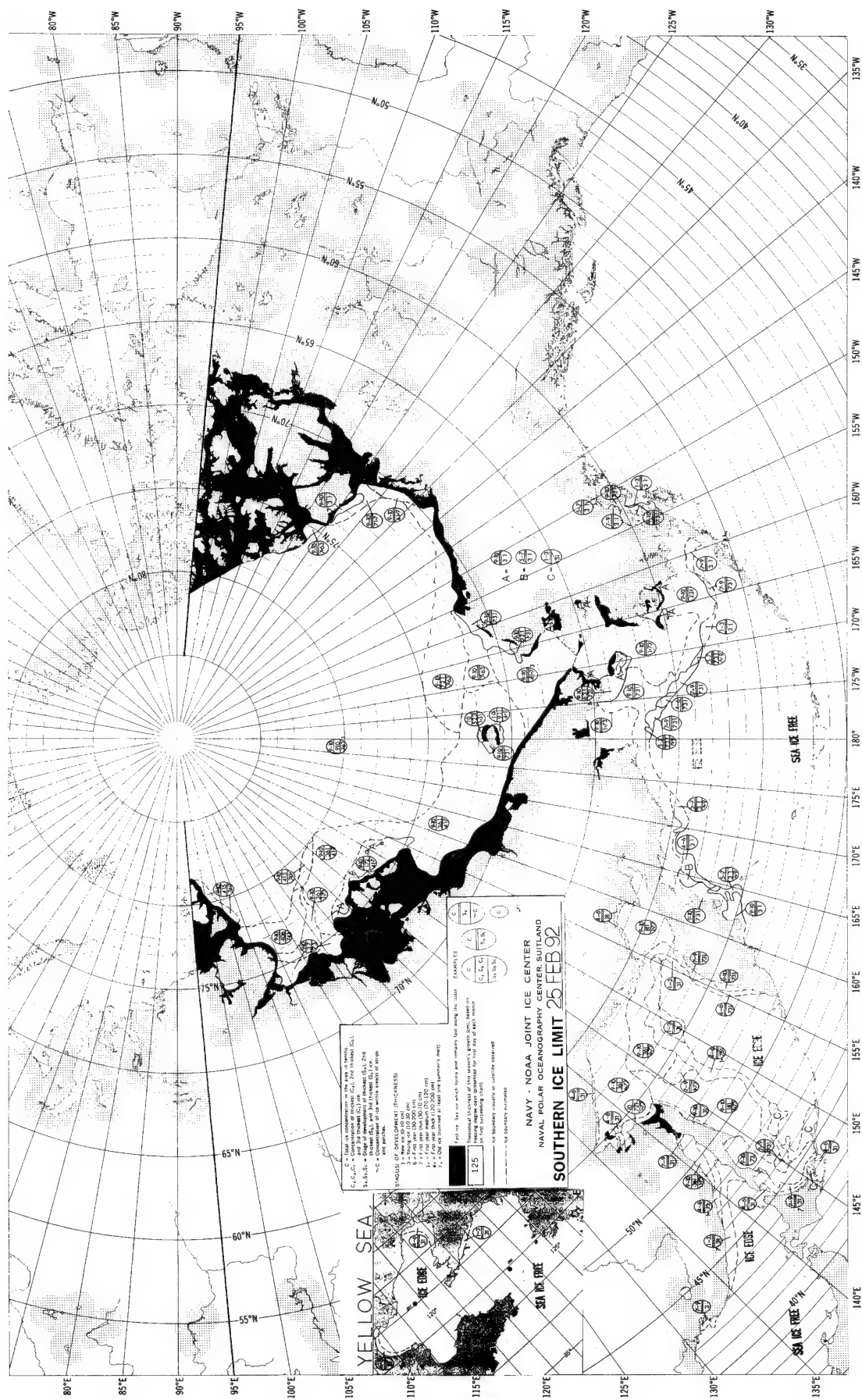


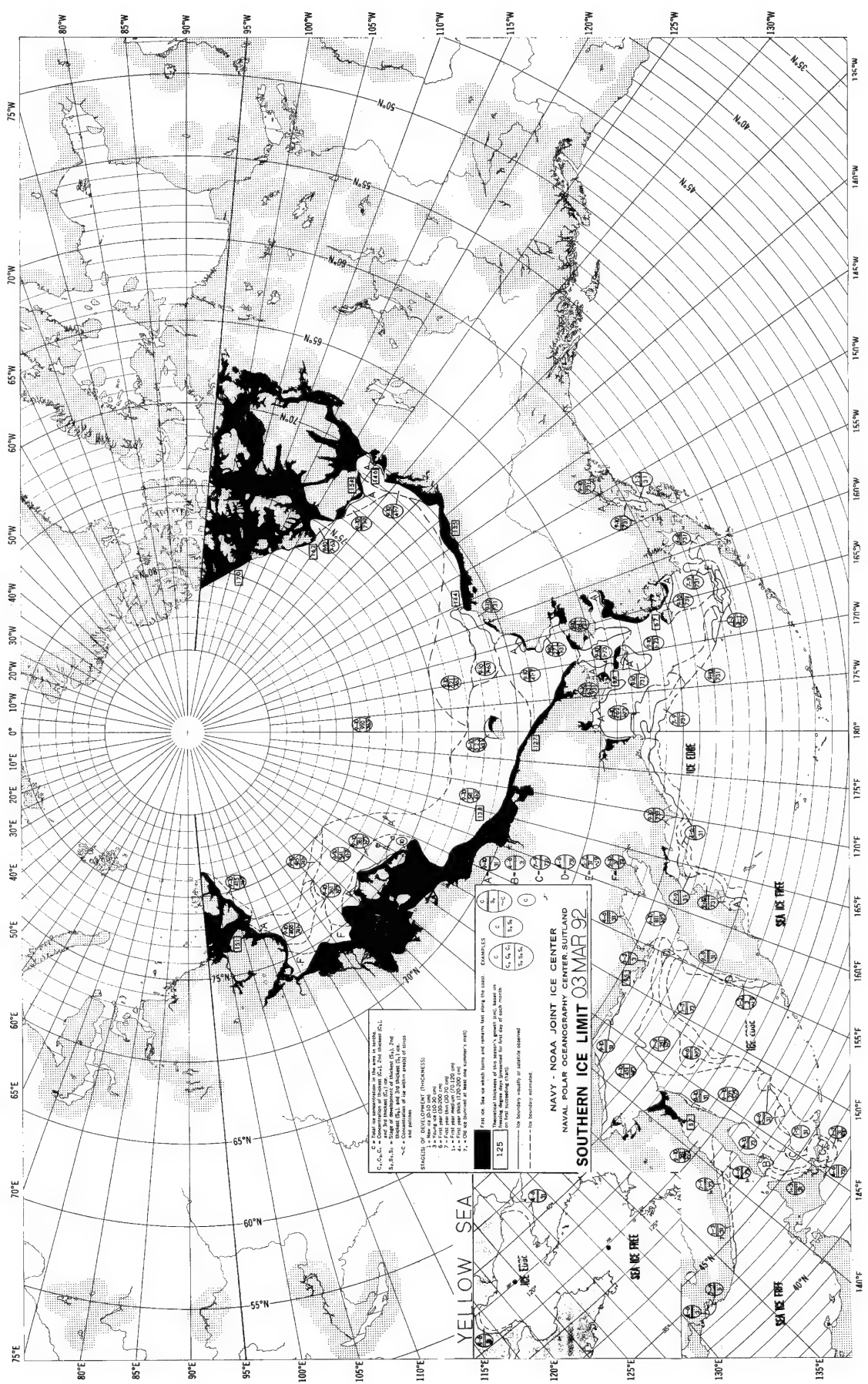


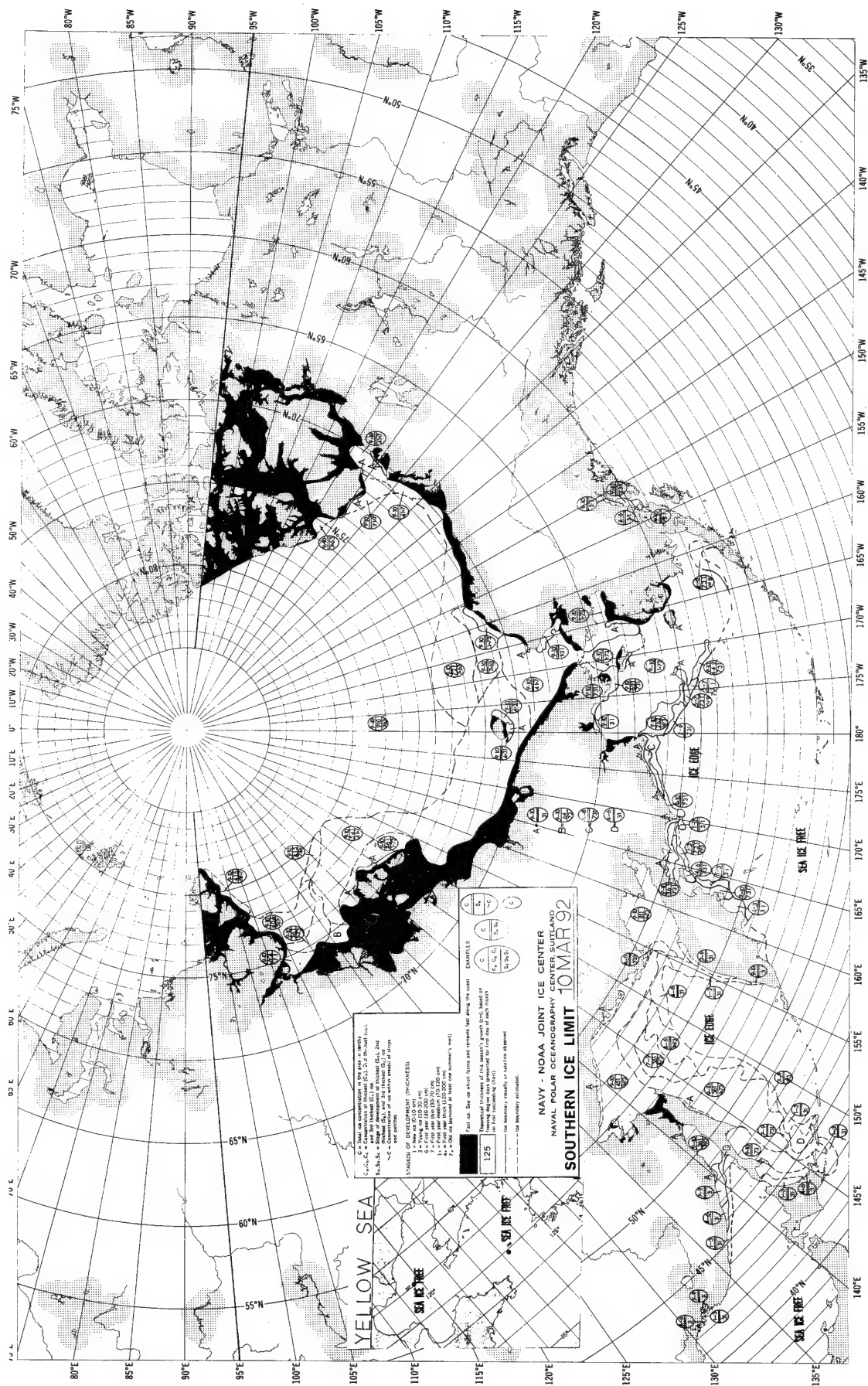


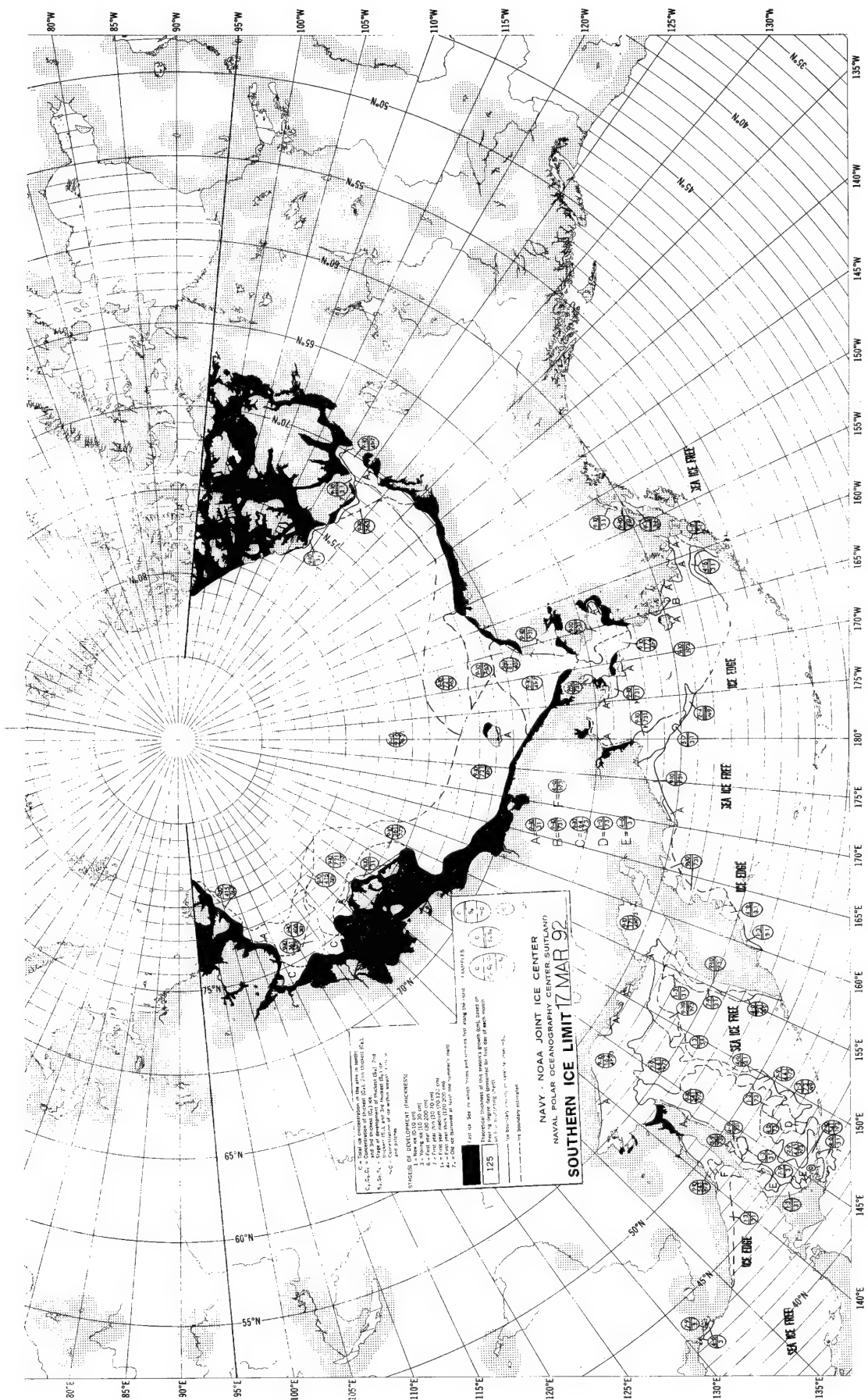


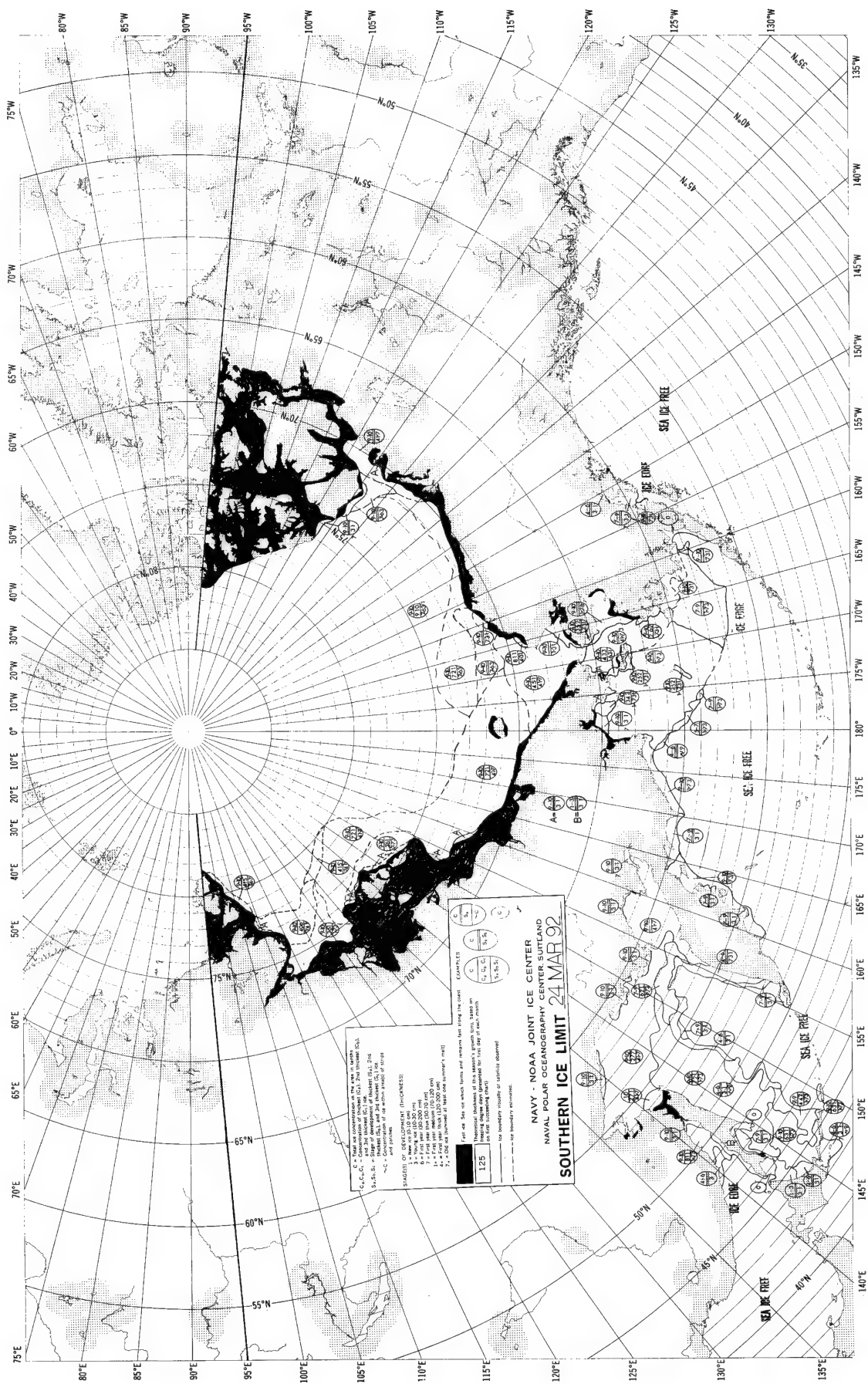


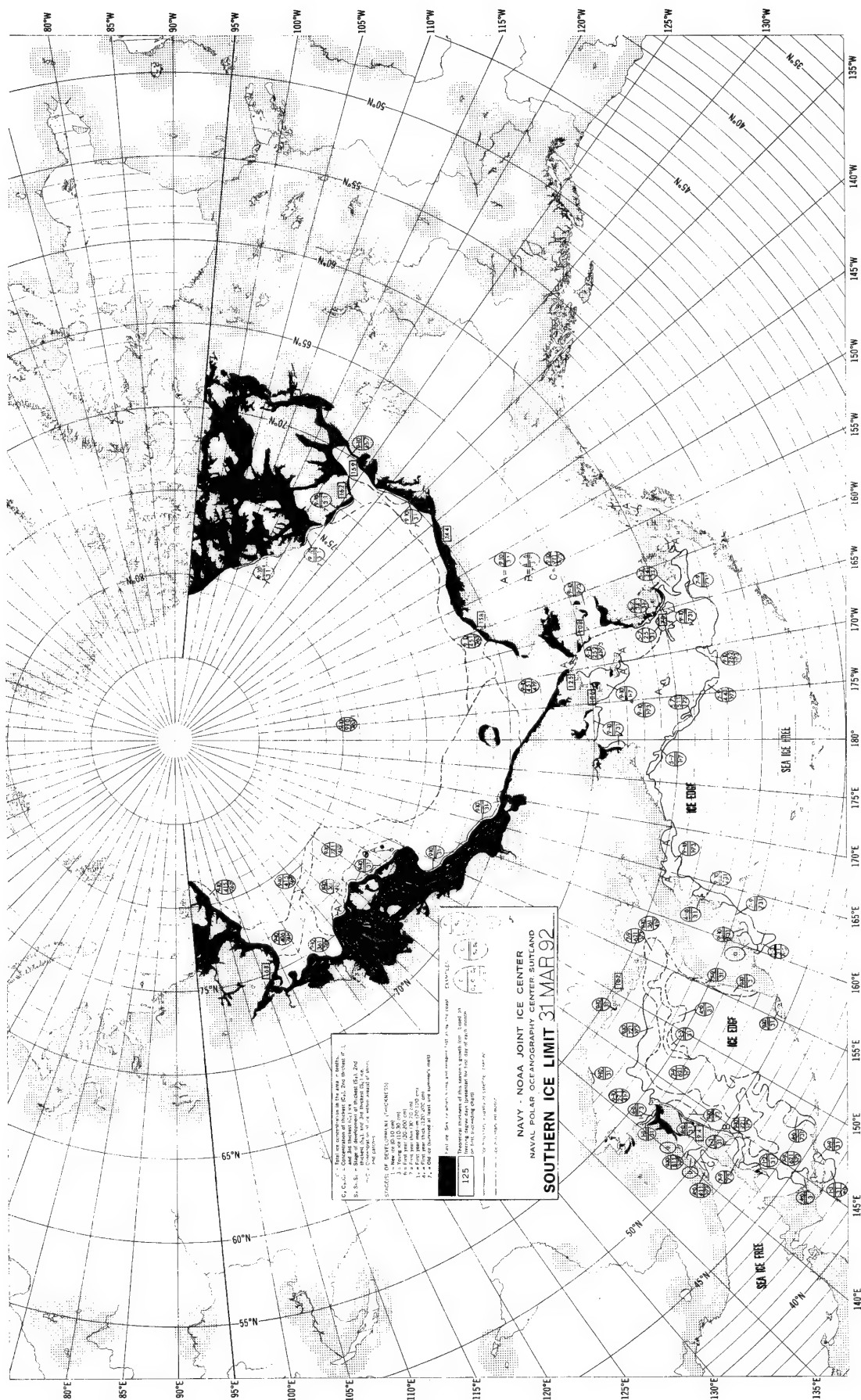


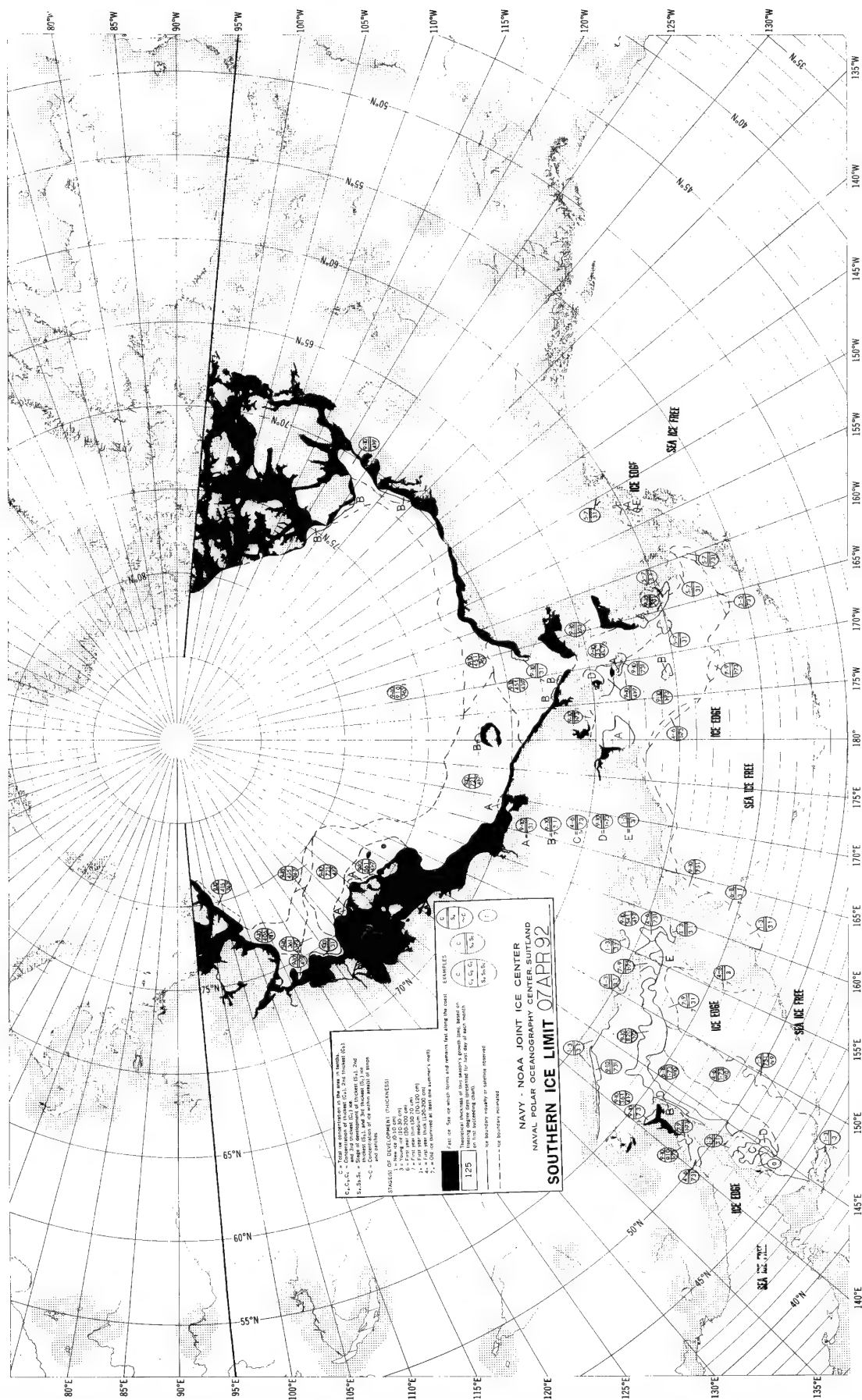


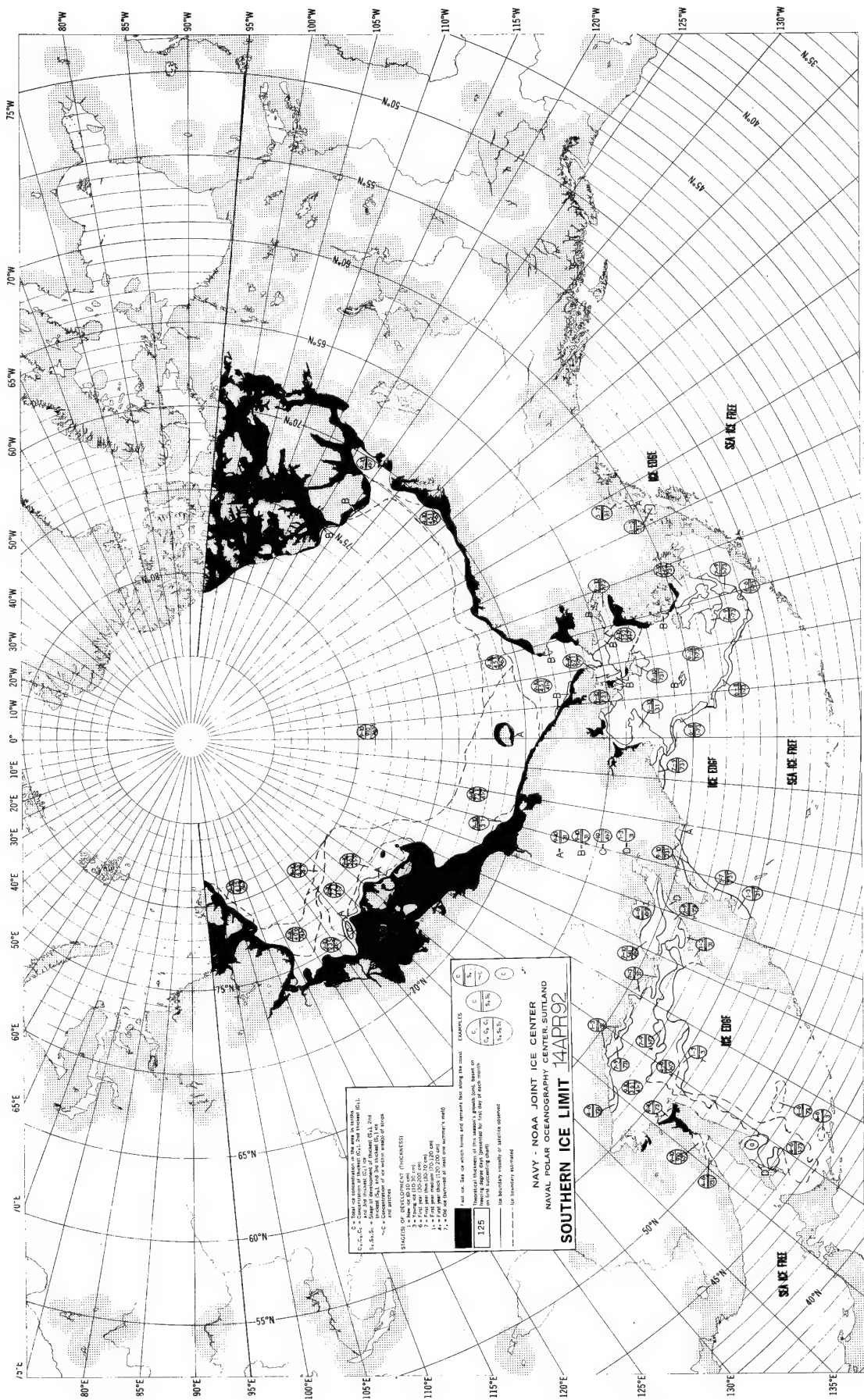


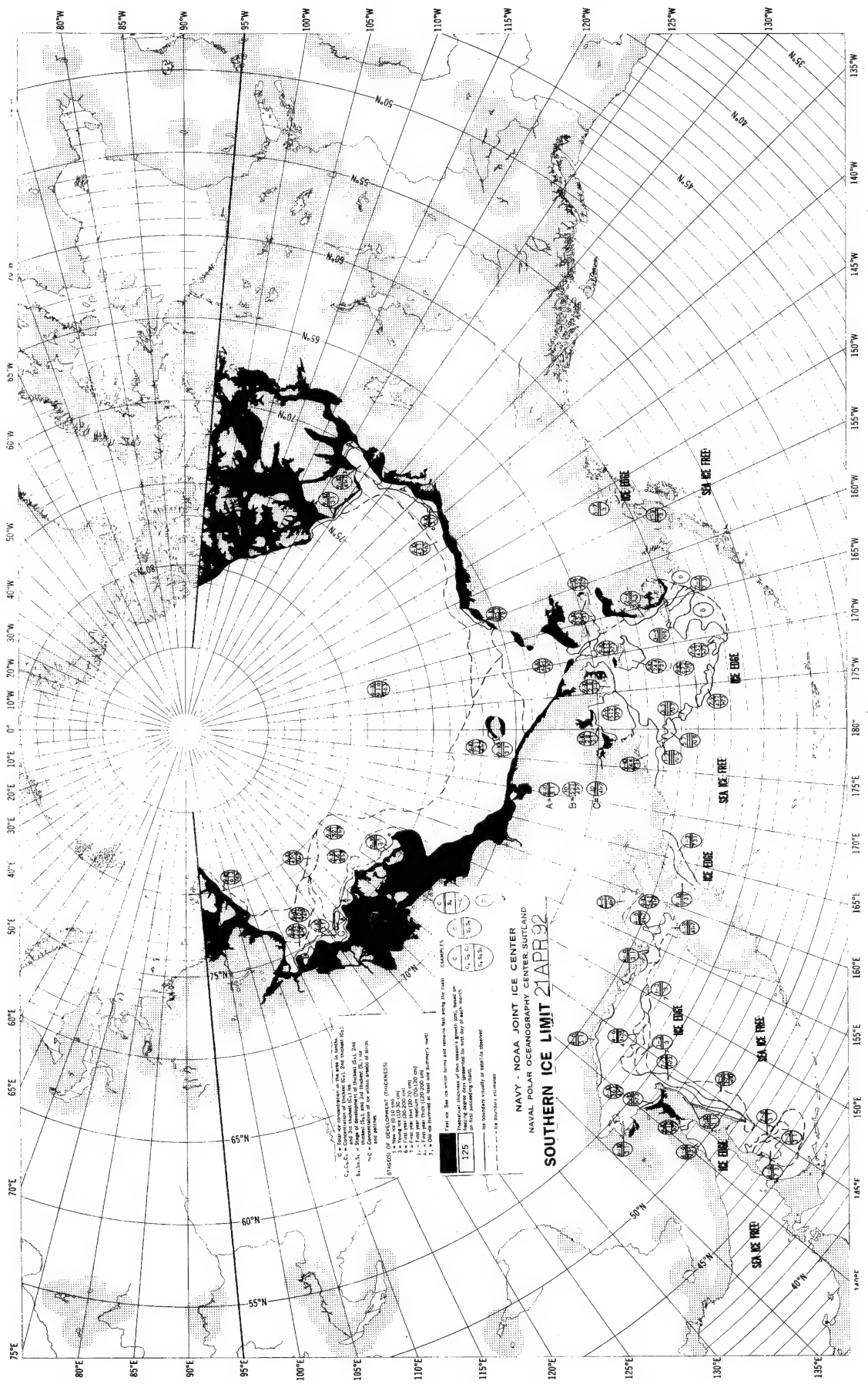


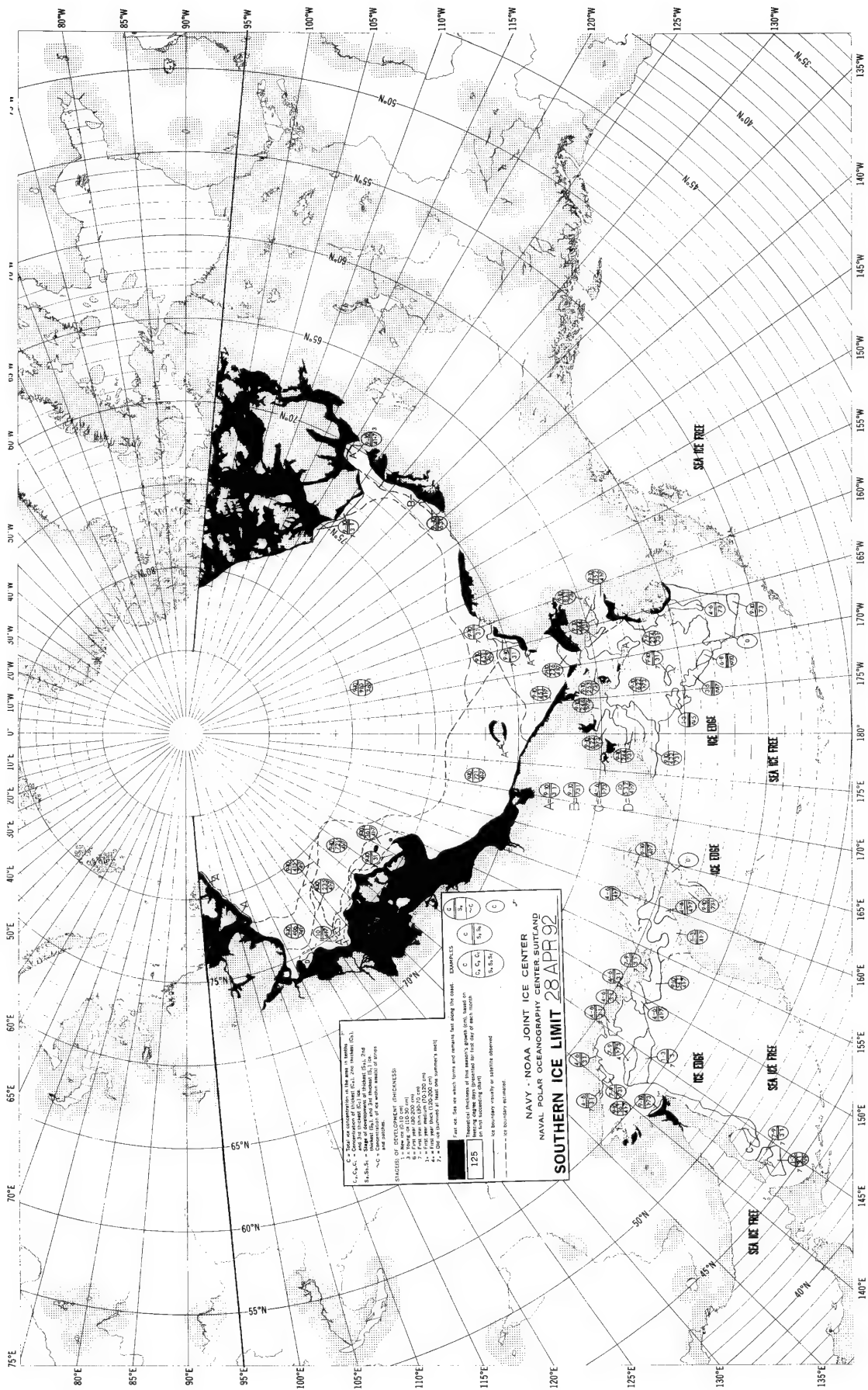


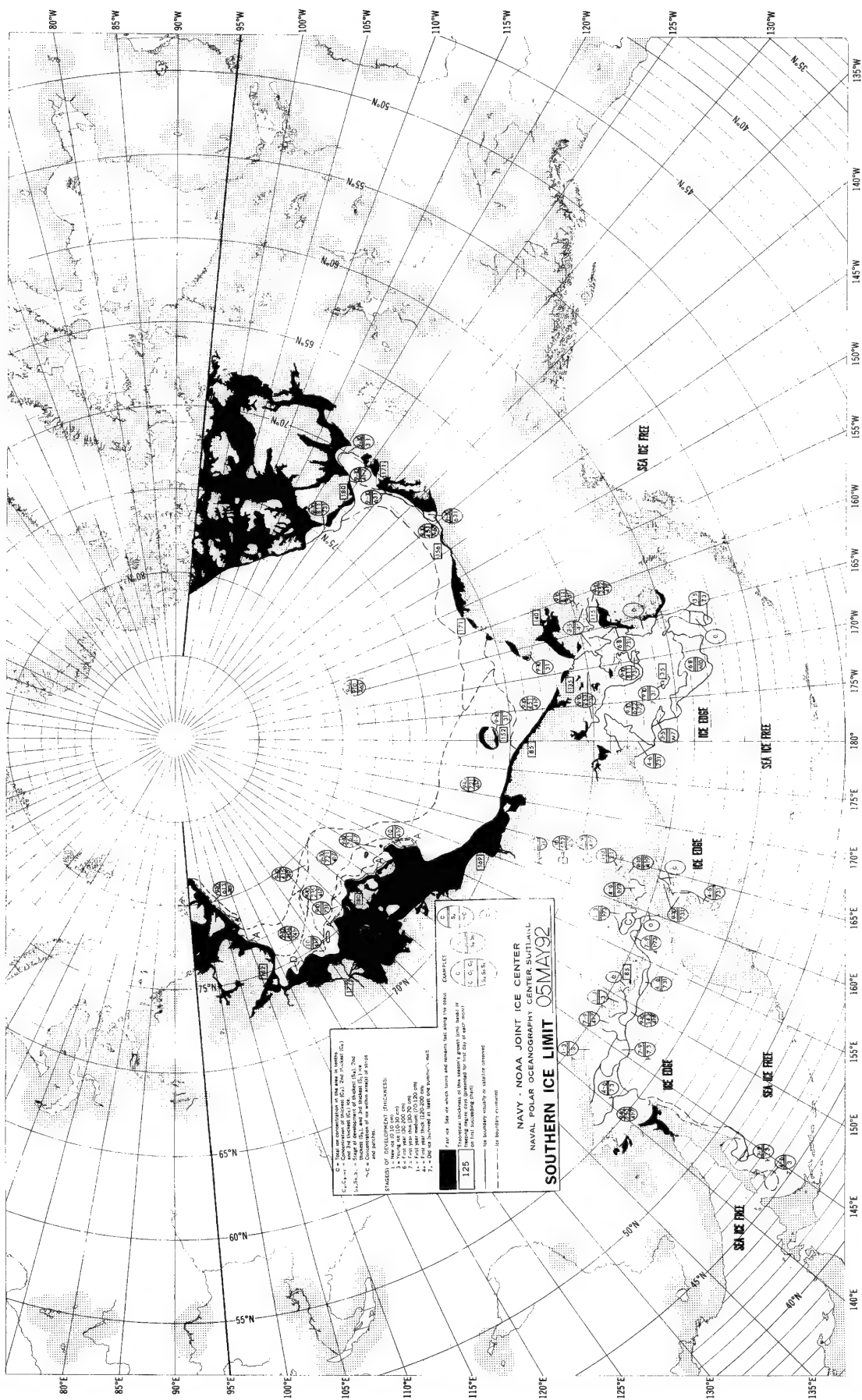


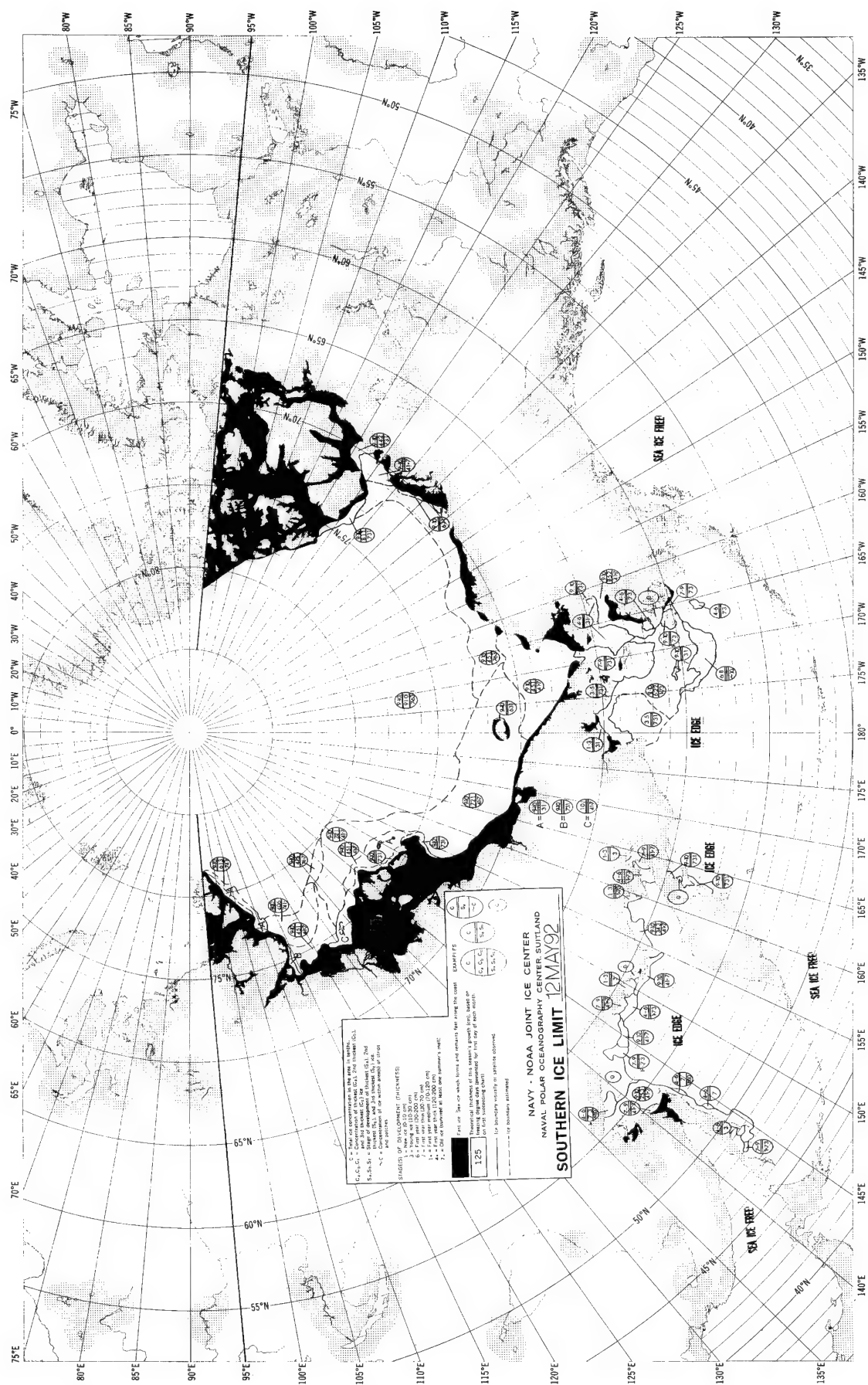


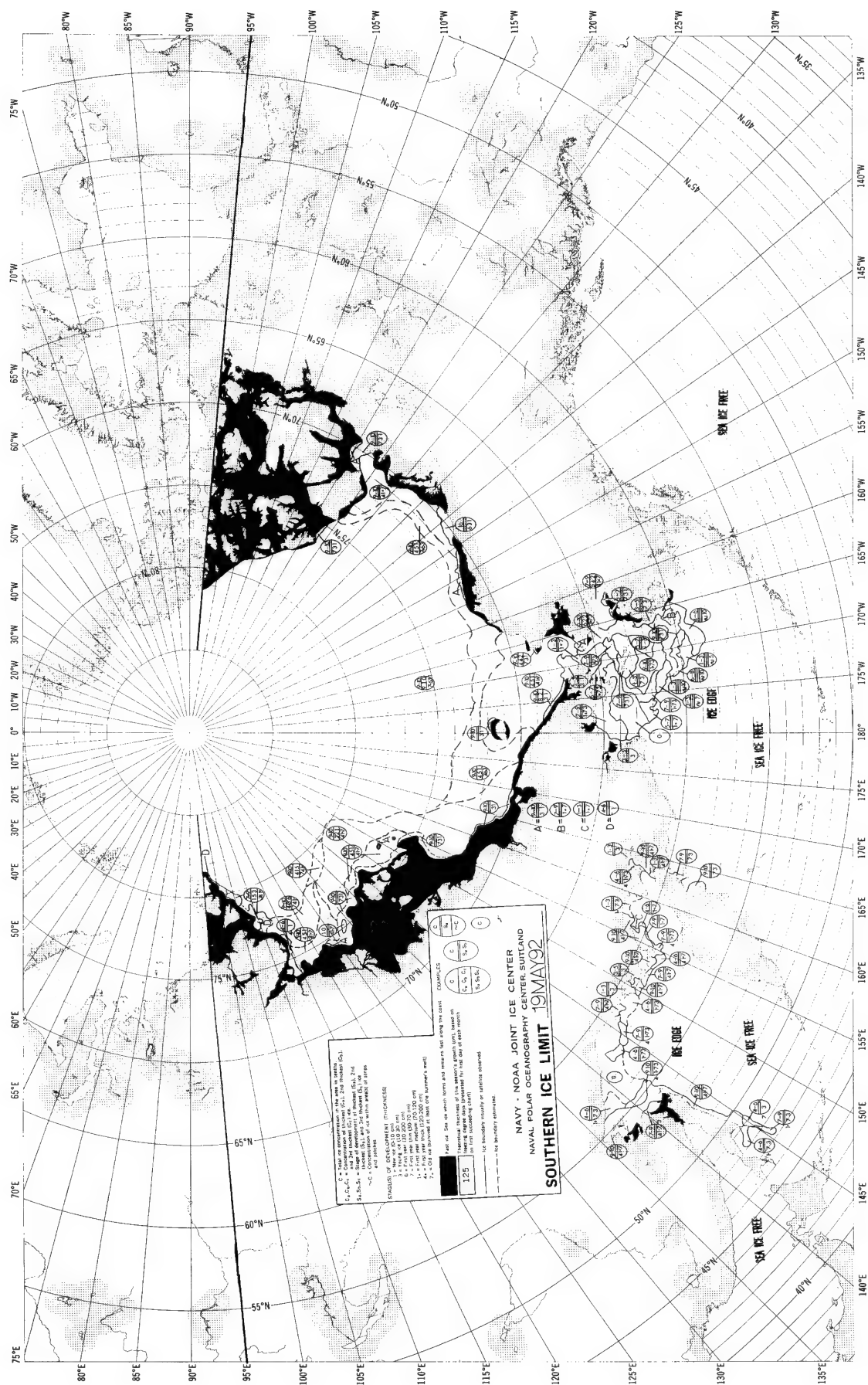


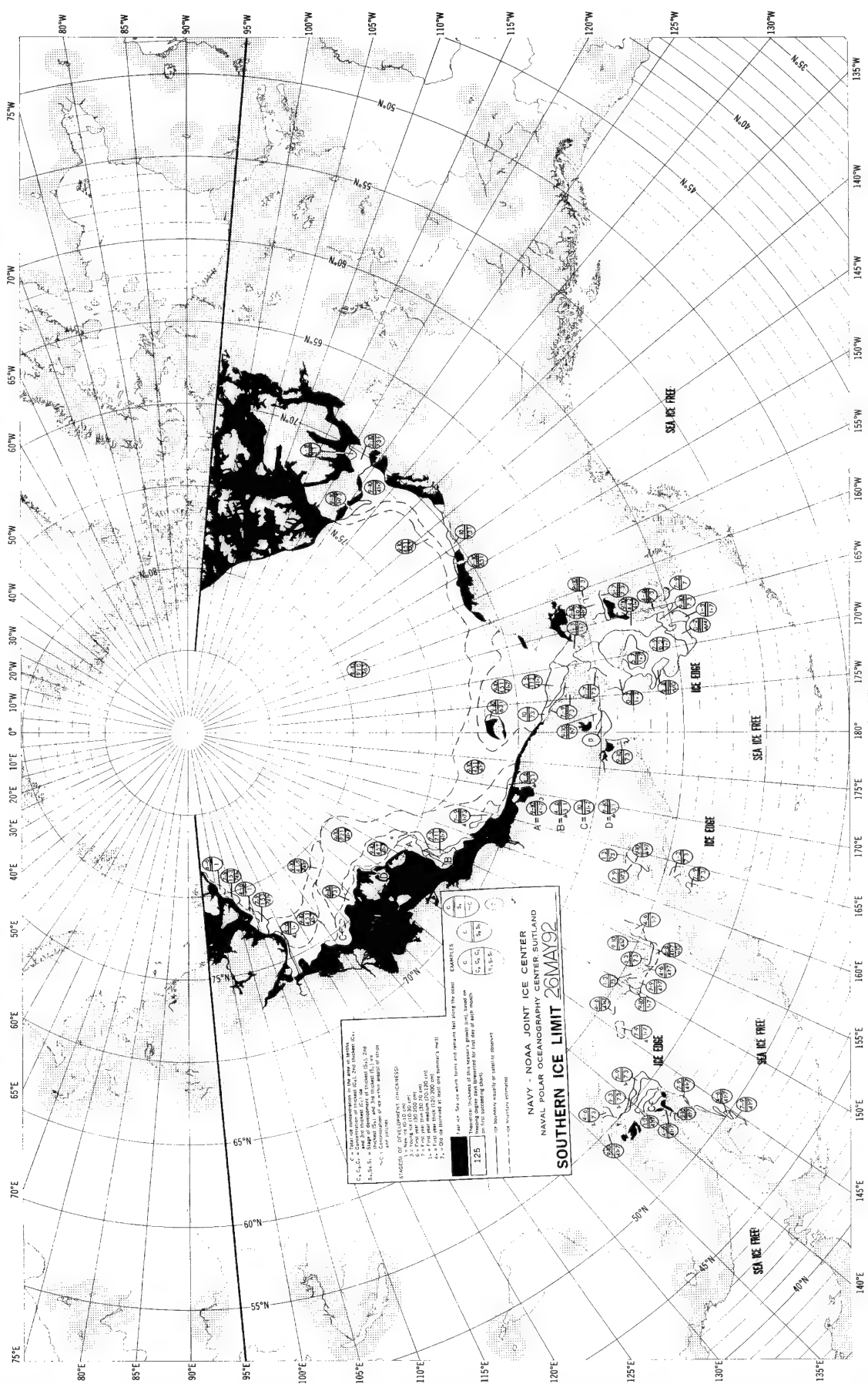


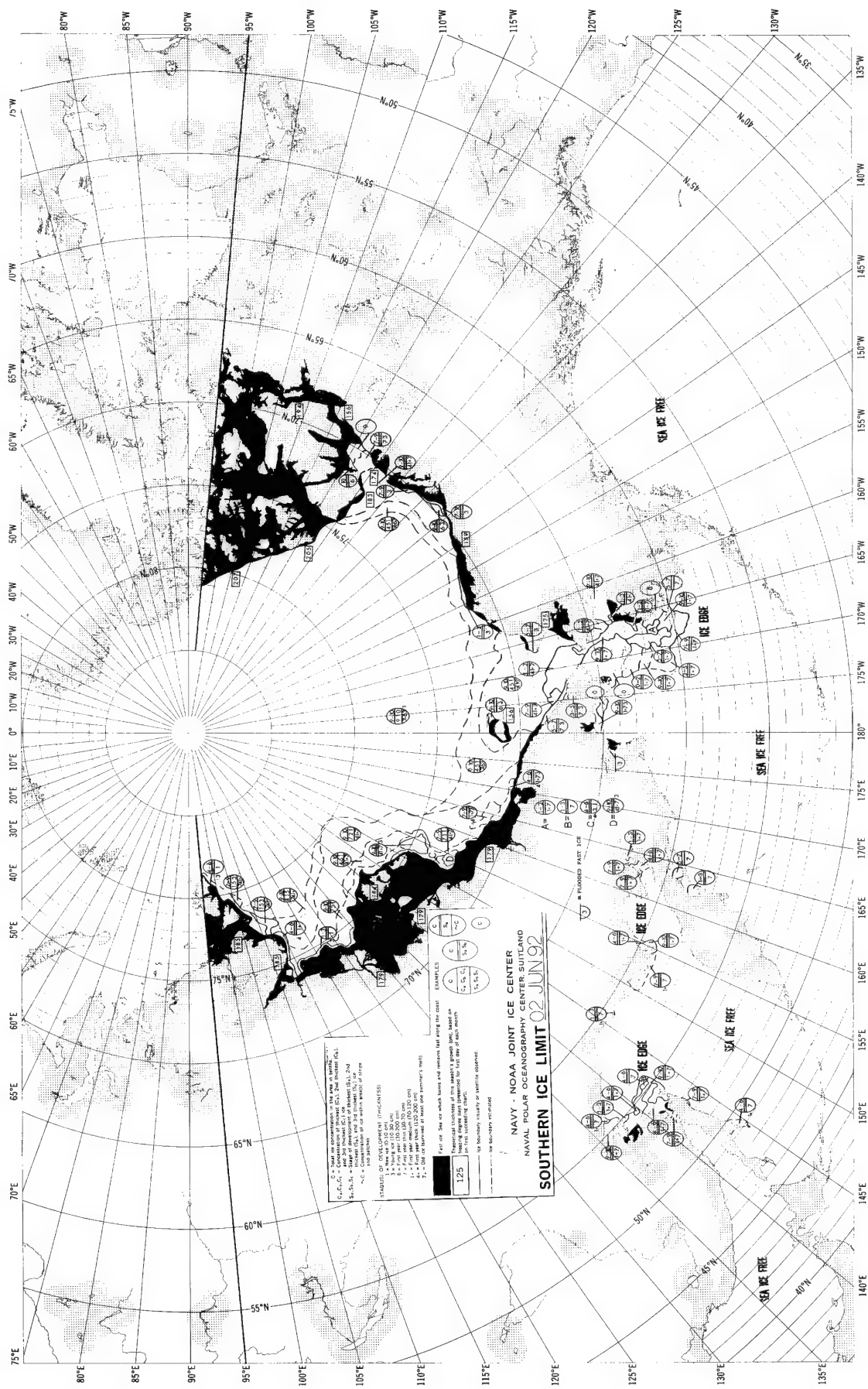


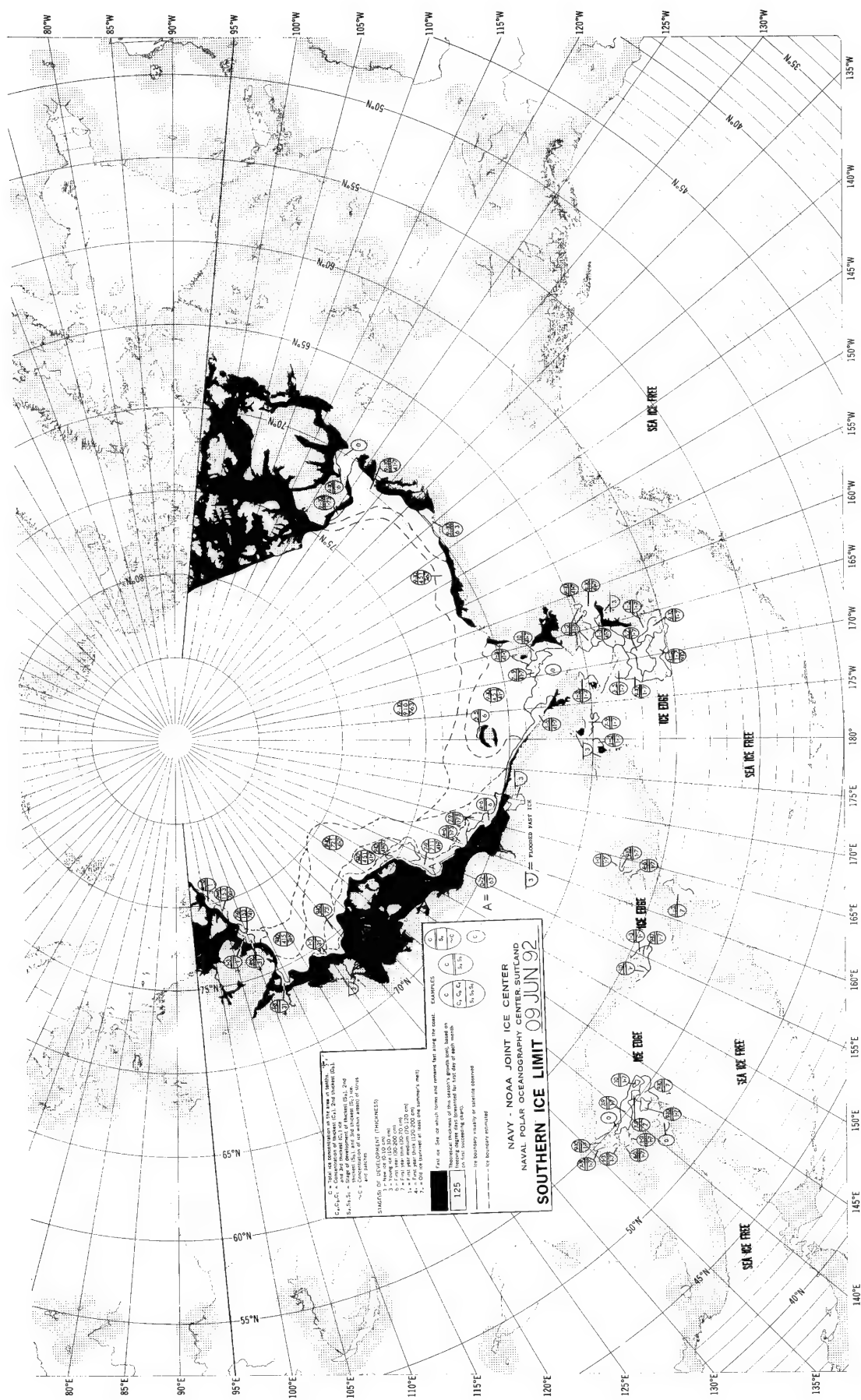


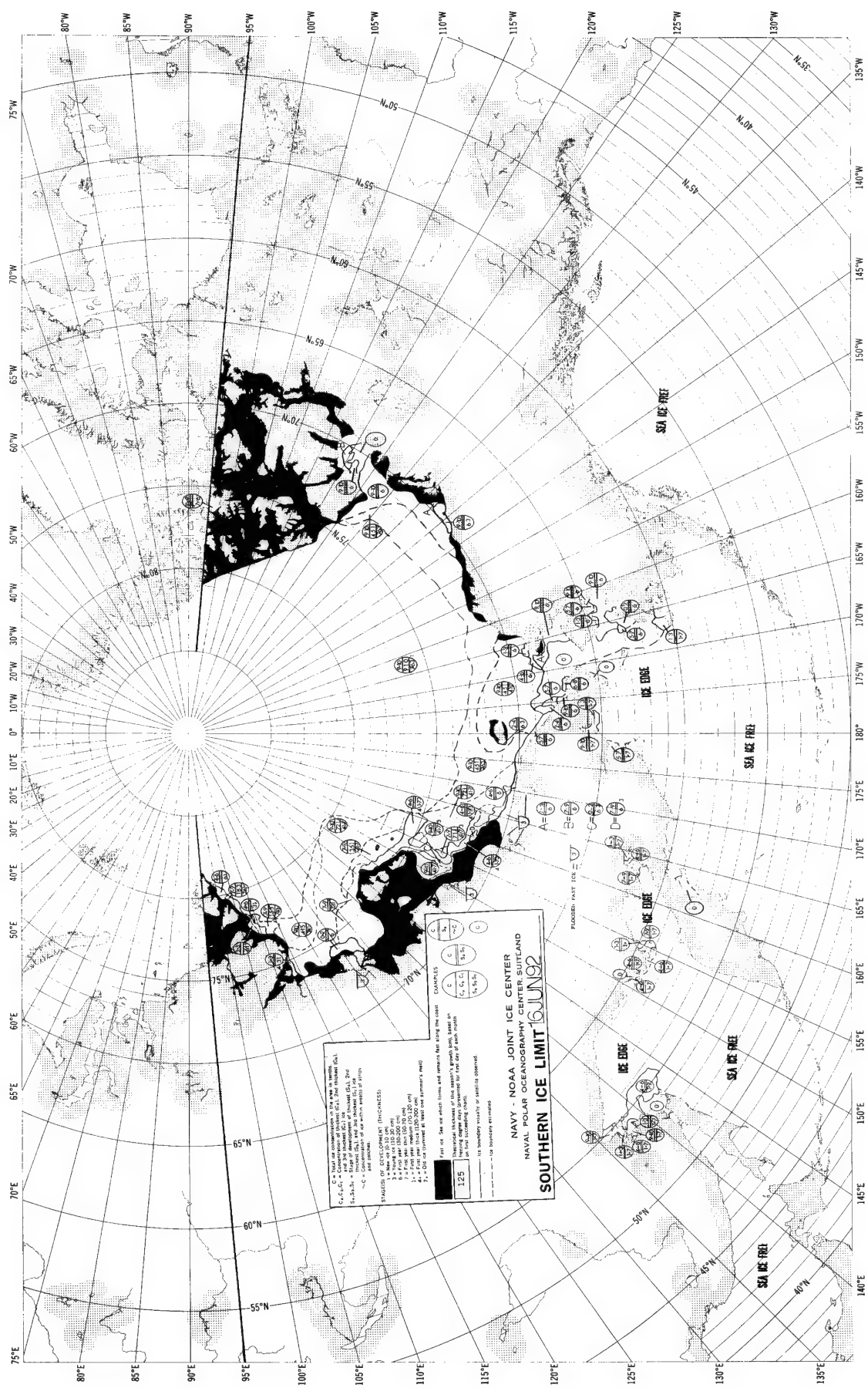


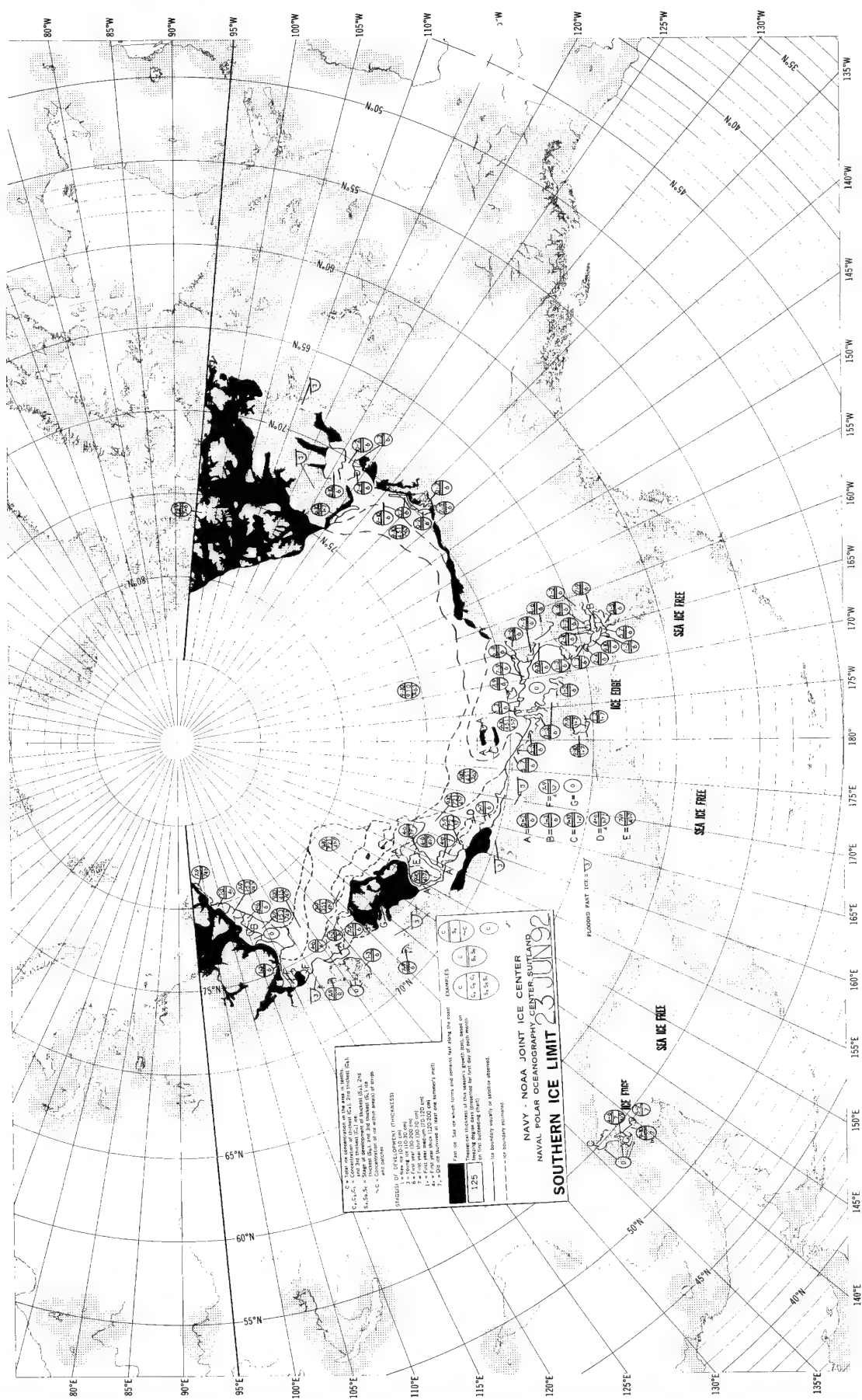


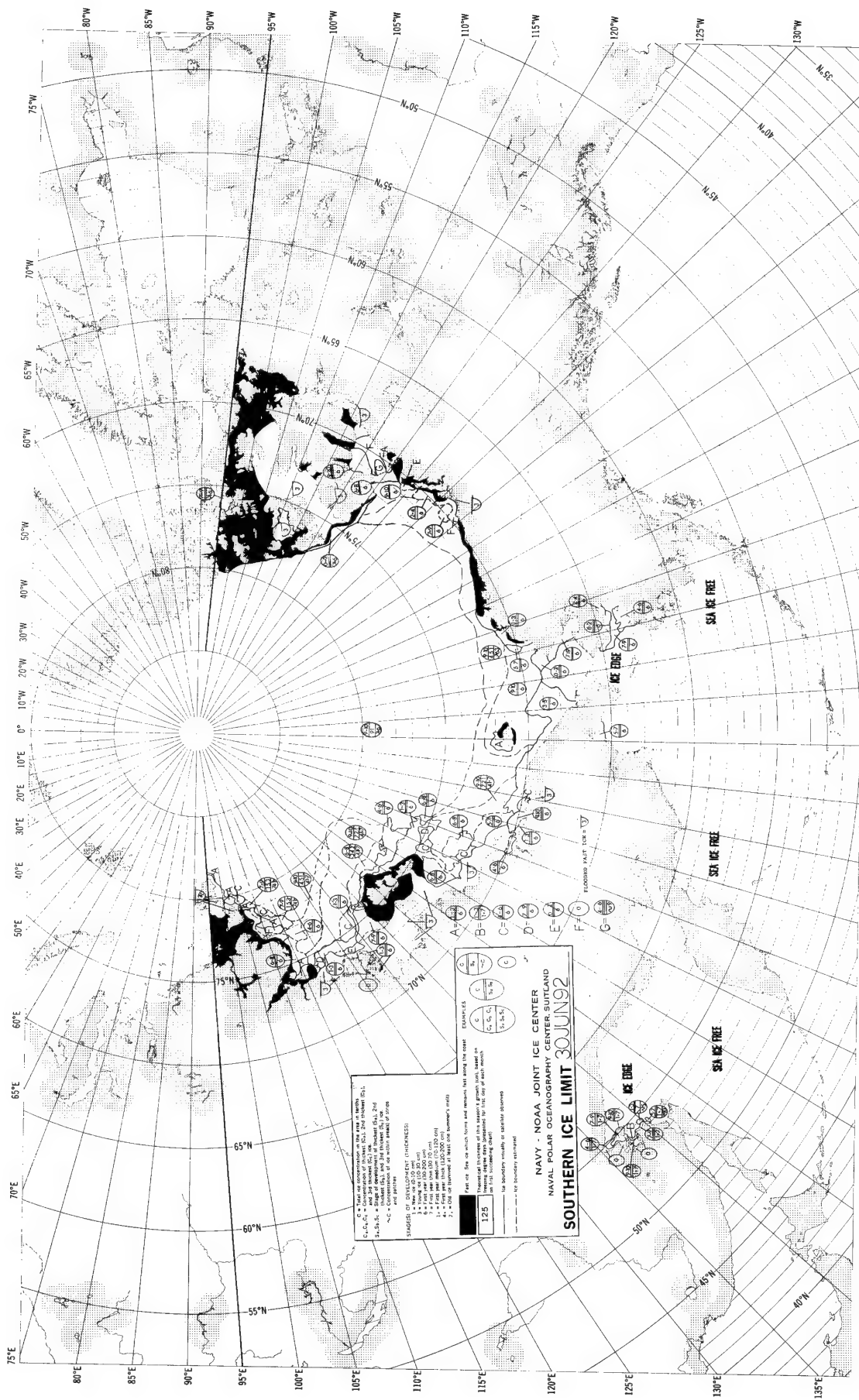


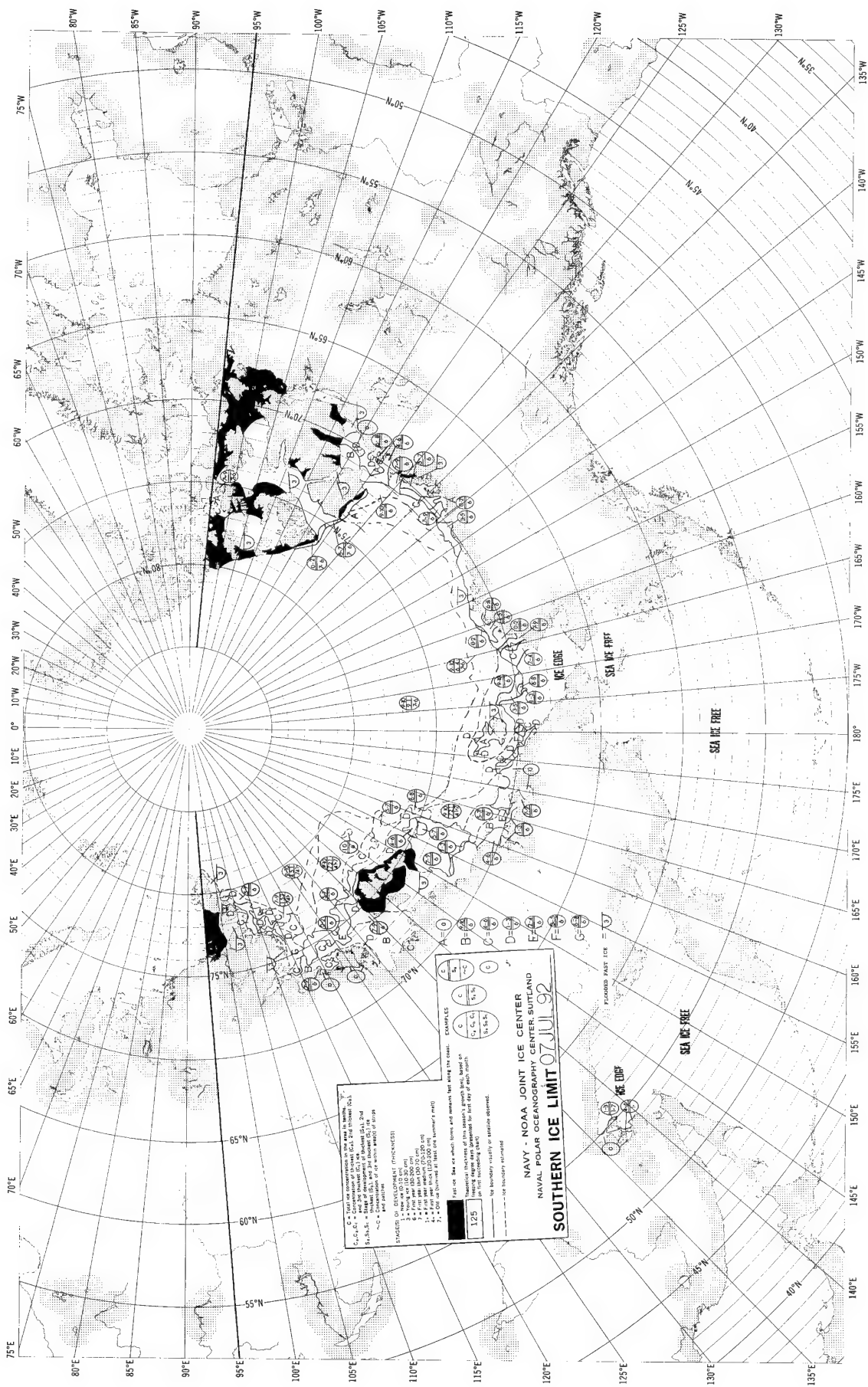


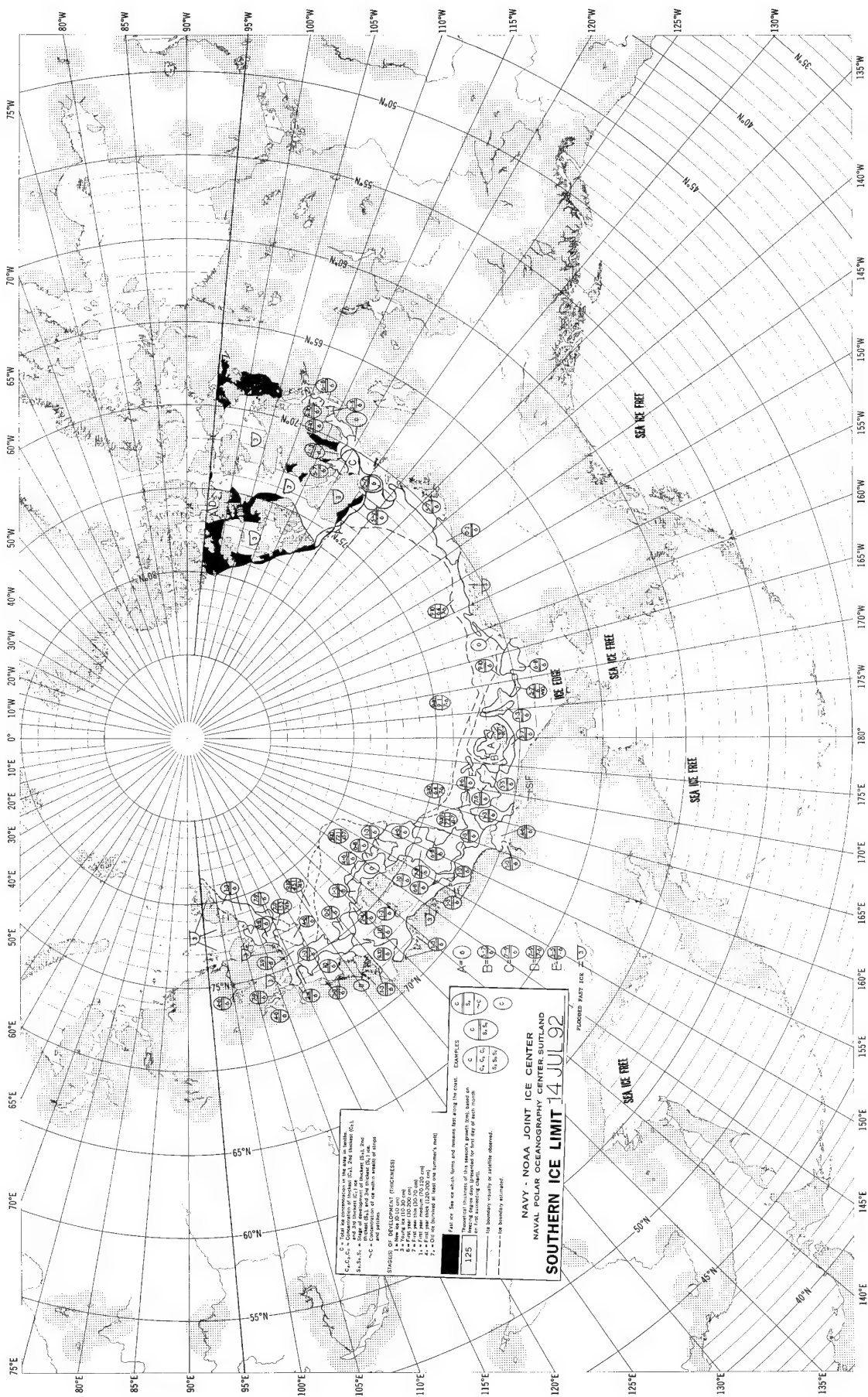


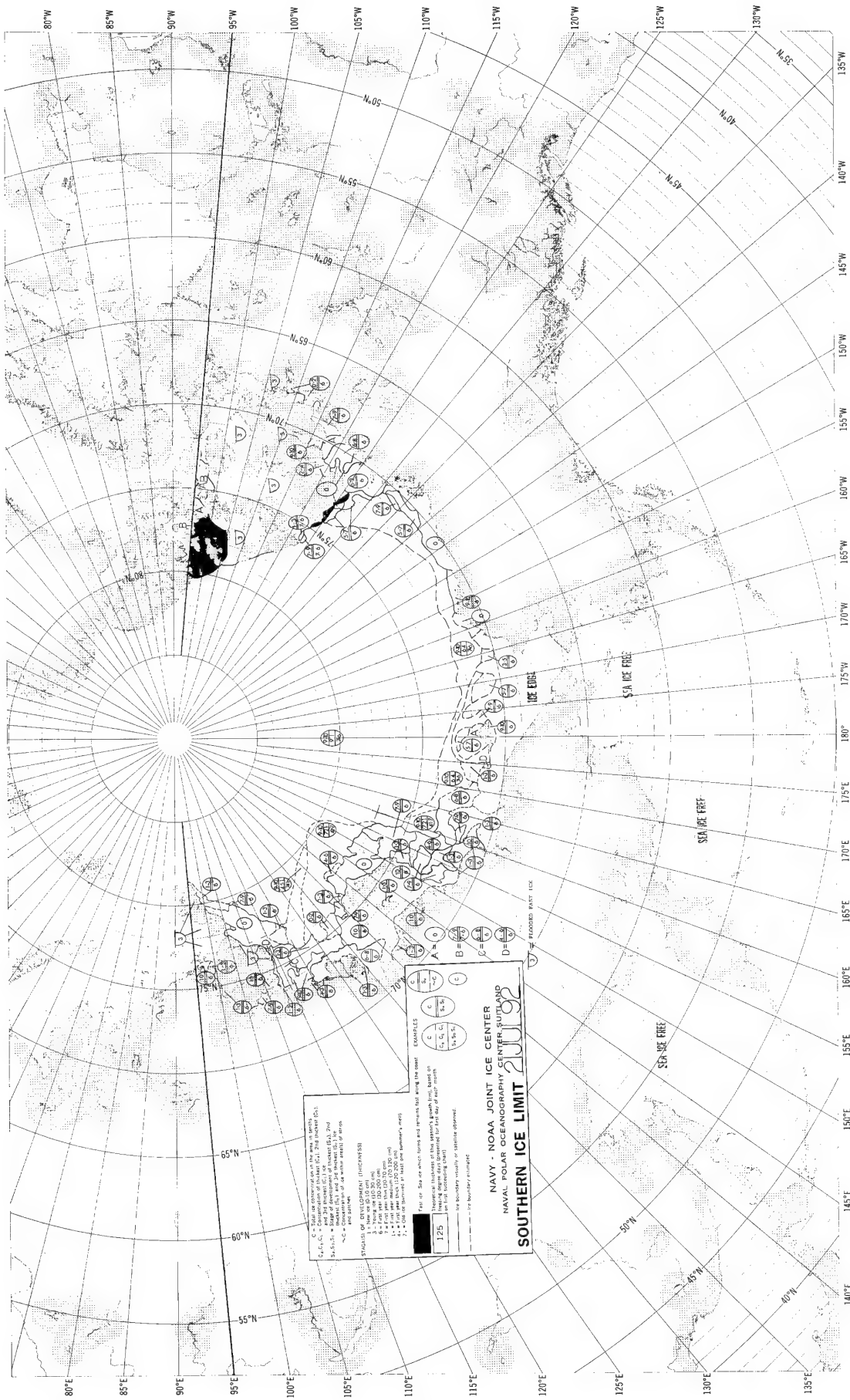












C = Contour of observation on the map in units of
 C, A, G, S = Contour of observation (C, A, G, S) (1000 ft)
 S, A, G, S = Range of observation (S, A, G, S) (1000 ft)
 S, A, G, S = Range of observation (S, A, G, S) (1000 ft)
 S, A, G, S = Range of observation (S, A, G, S) (1000 ft)

1 = 1000 ft (305 m)
 2 = 2000 ft (610 m)
 3 = 3000 ft (914 m)
 4 = 4000 ft (1219 m)
 5 = 5000 ft (1524 m)
 6 = 6000 ft (1829 m)
 7 = 7000 ft (2134 m)

125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)

125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)
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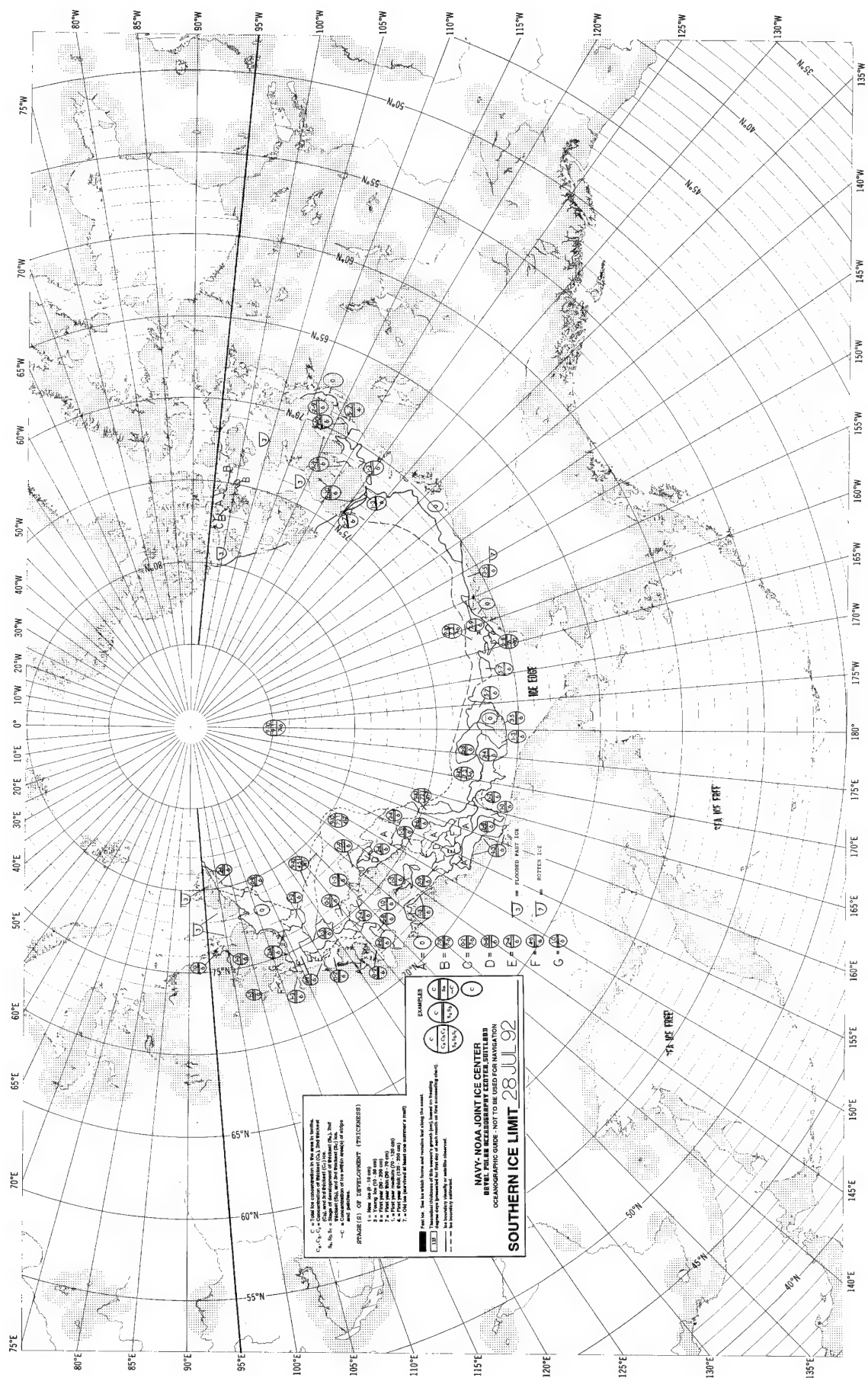
125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)

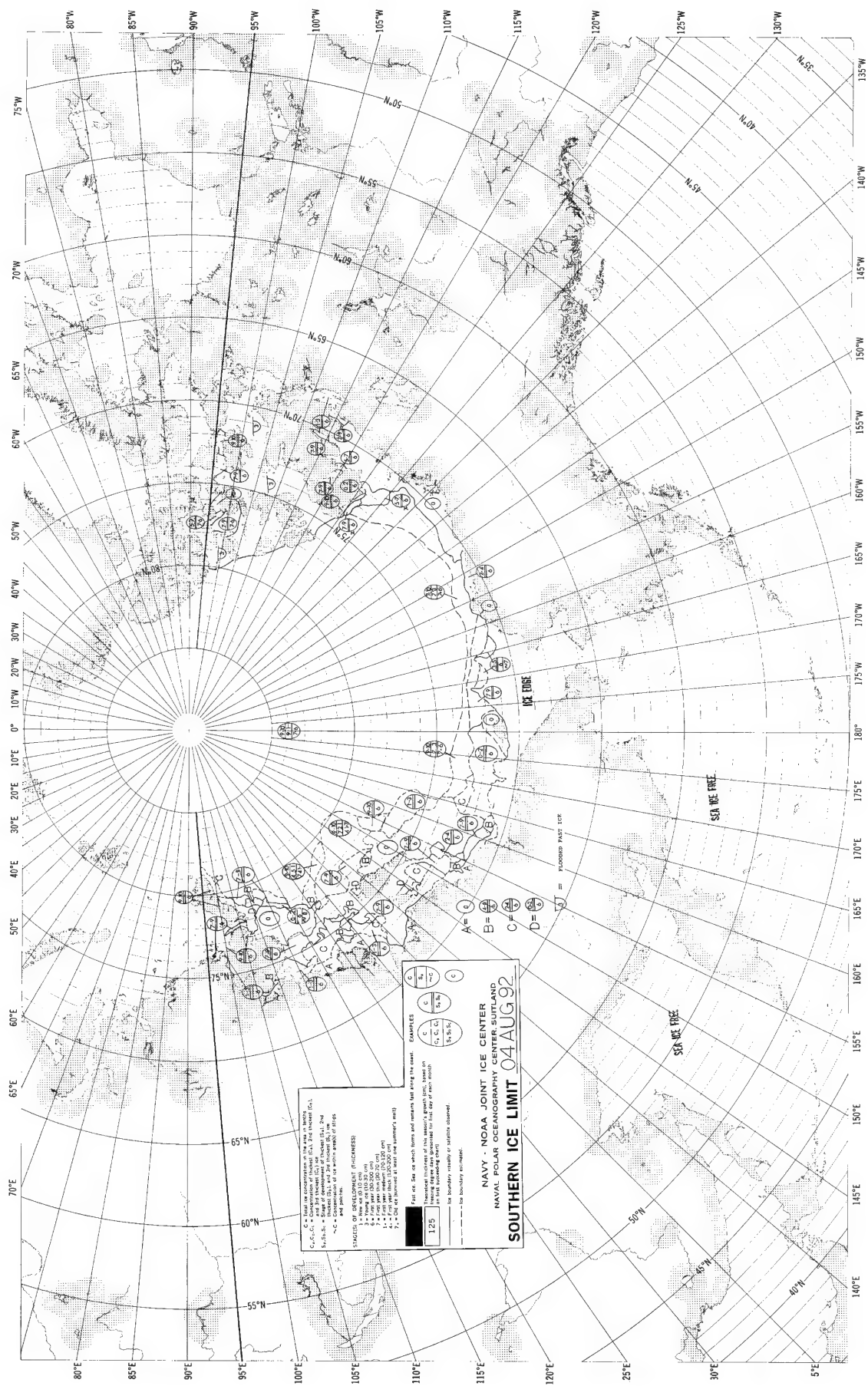
125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)

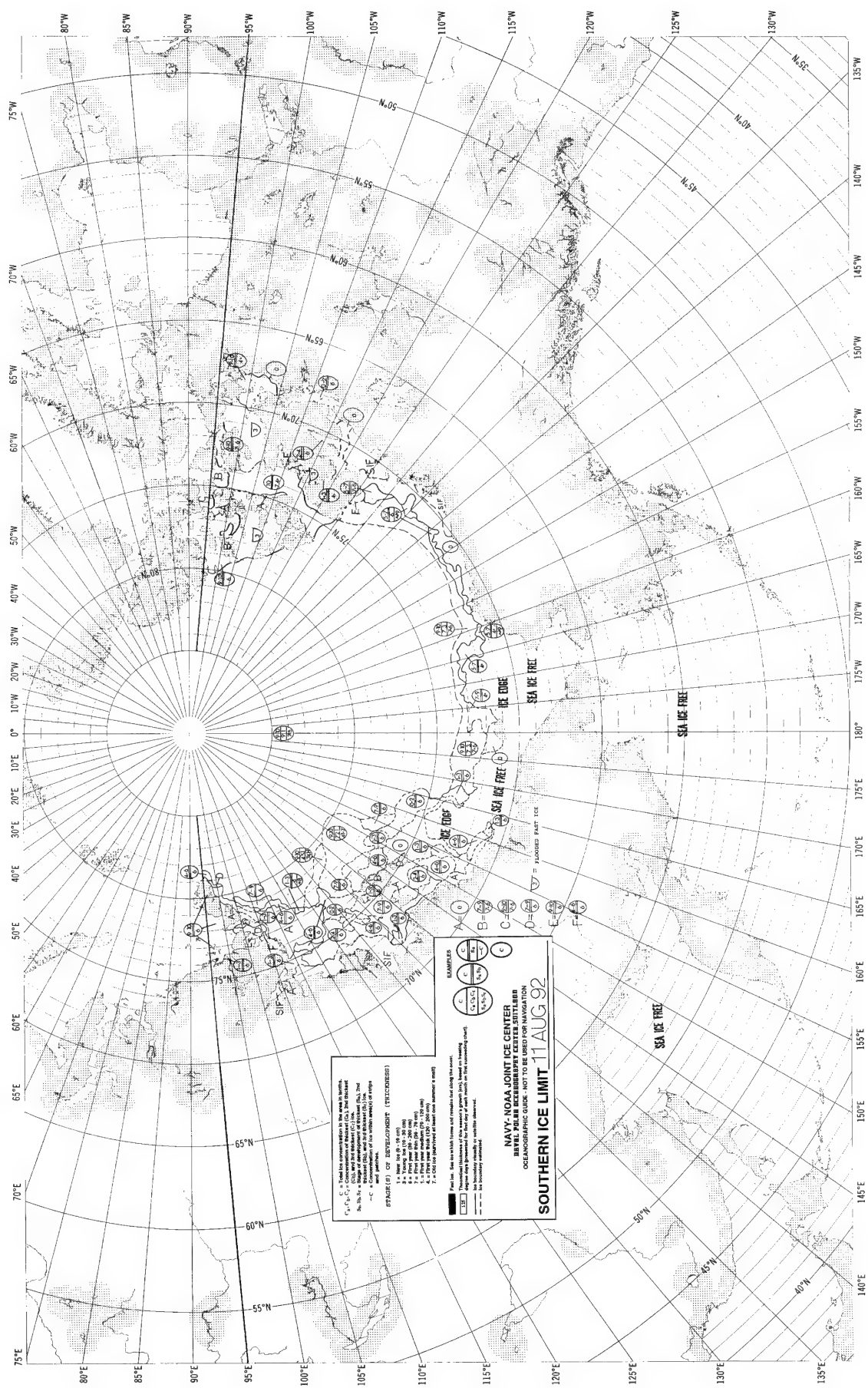
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 125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)

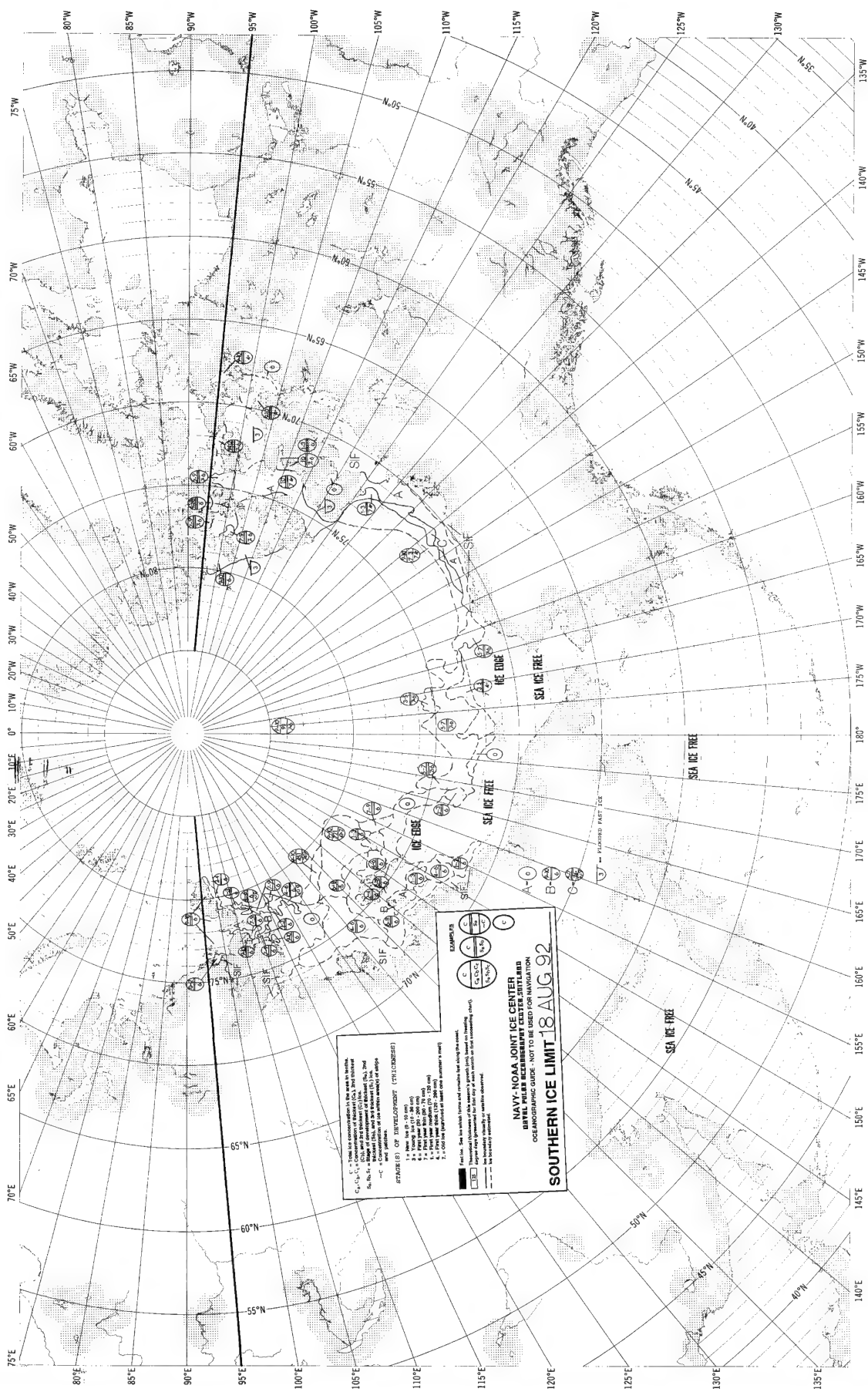
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 125 = 12500 ft (3810 m)
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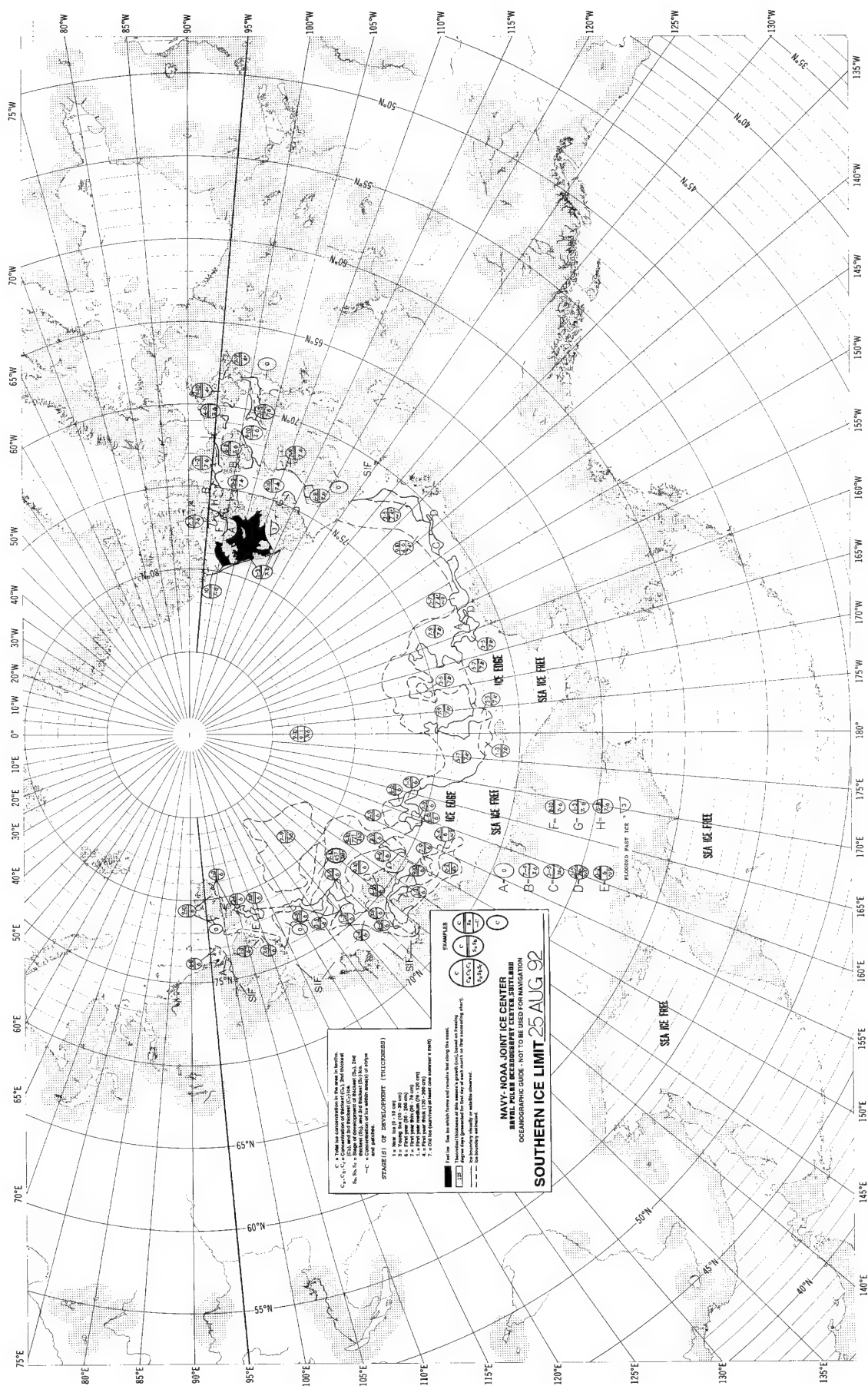
125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)
 125 = 12500 ft (3810 m)

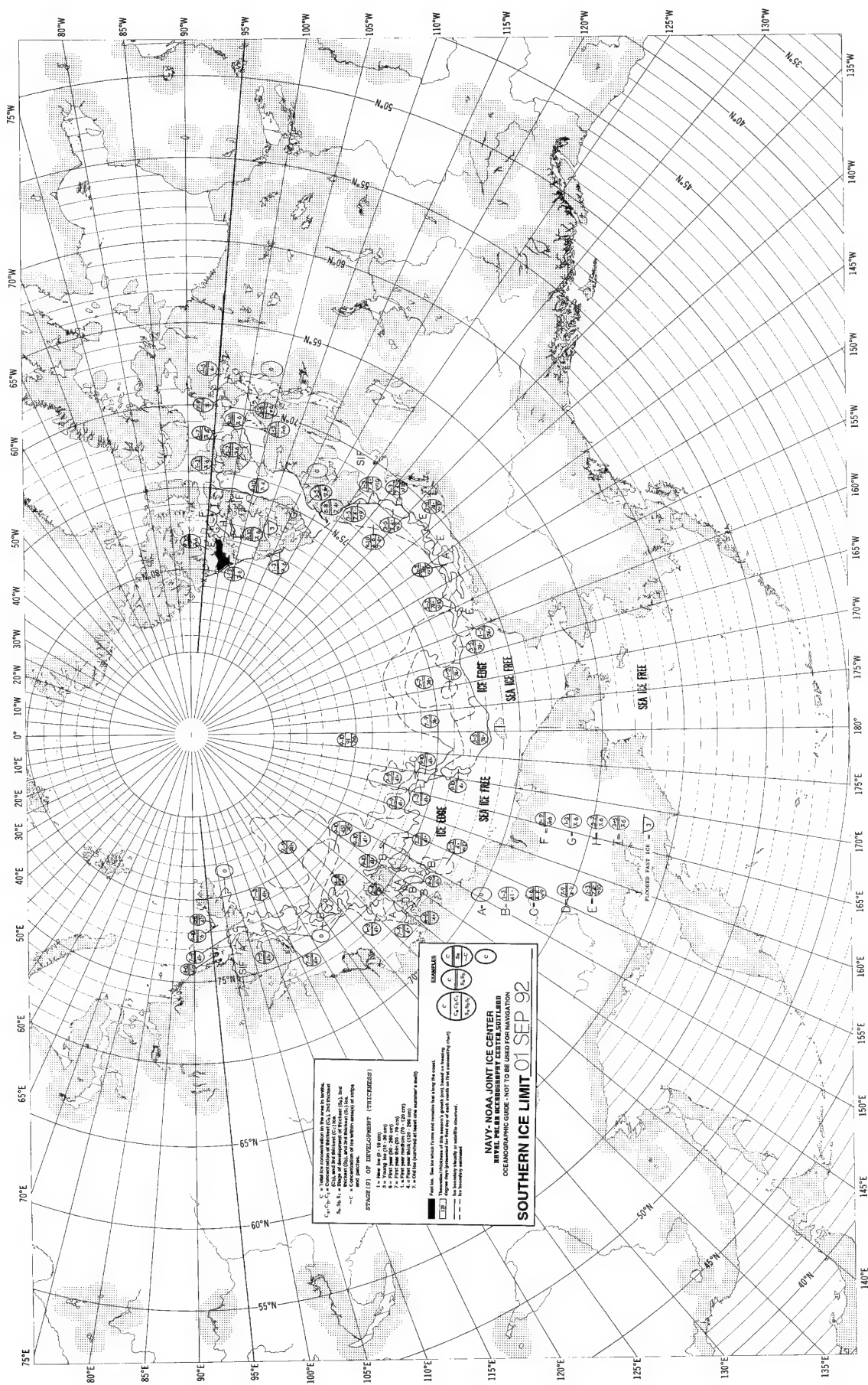


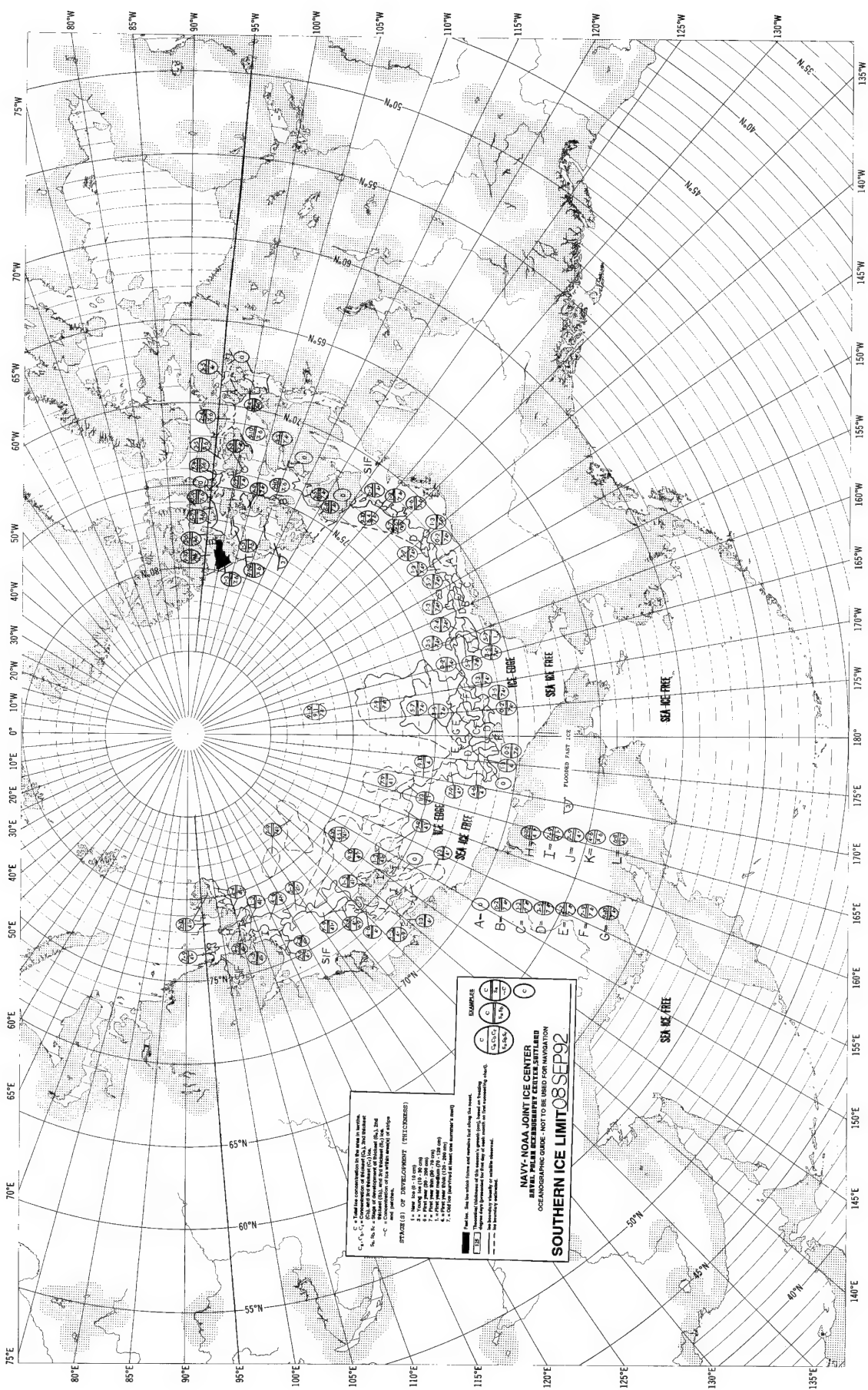


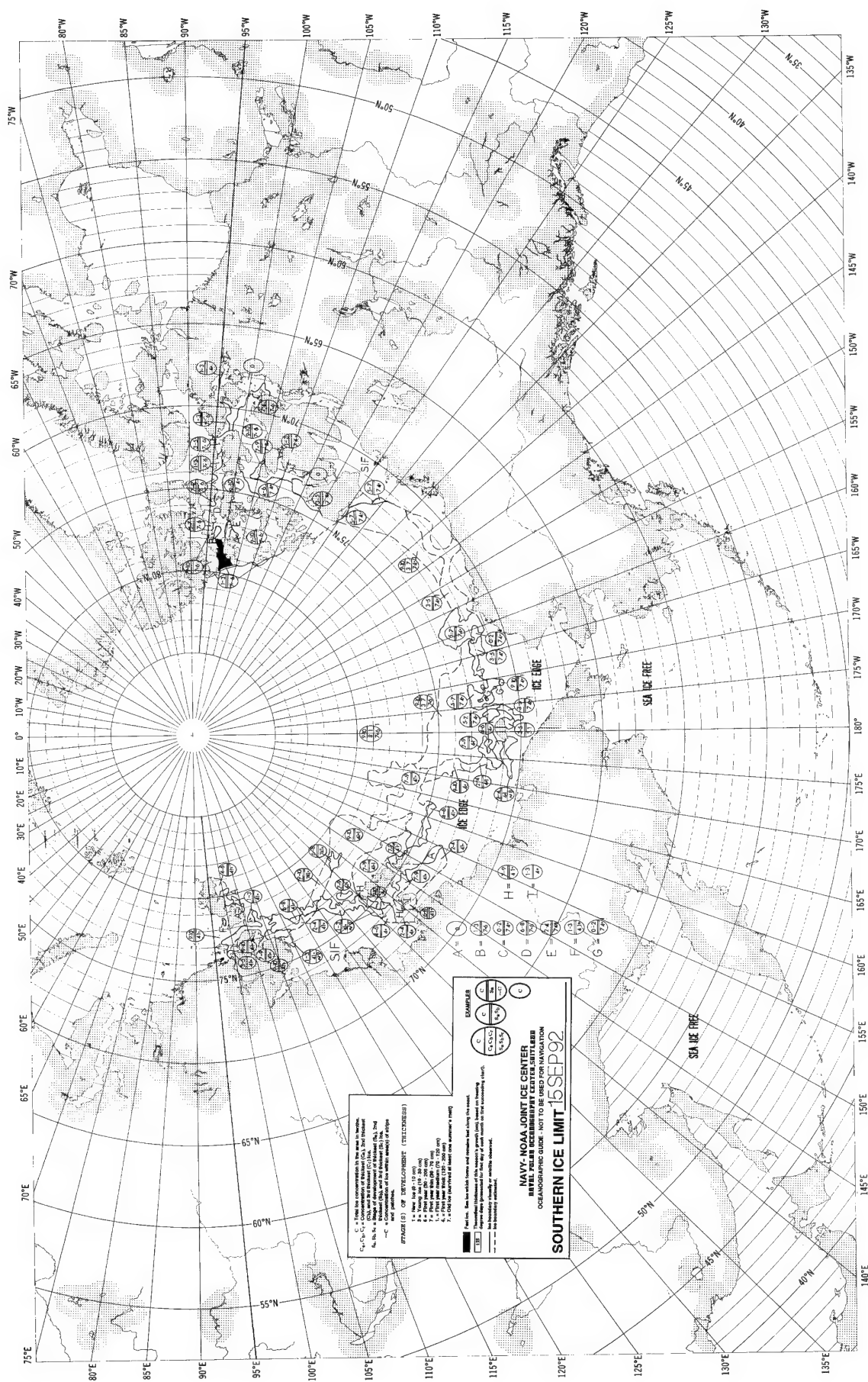


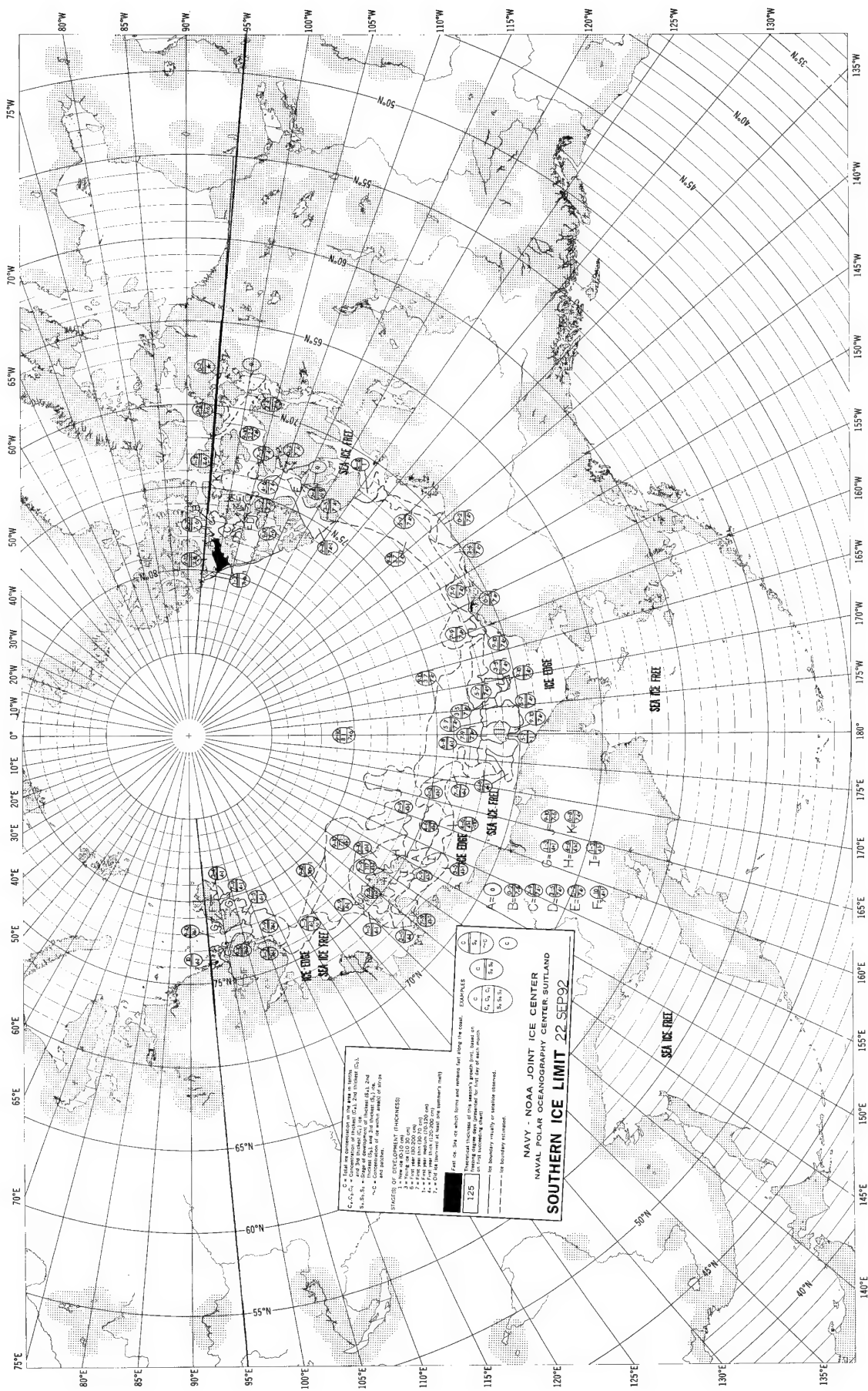


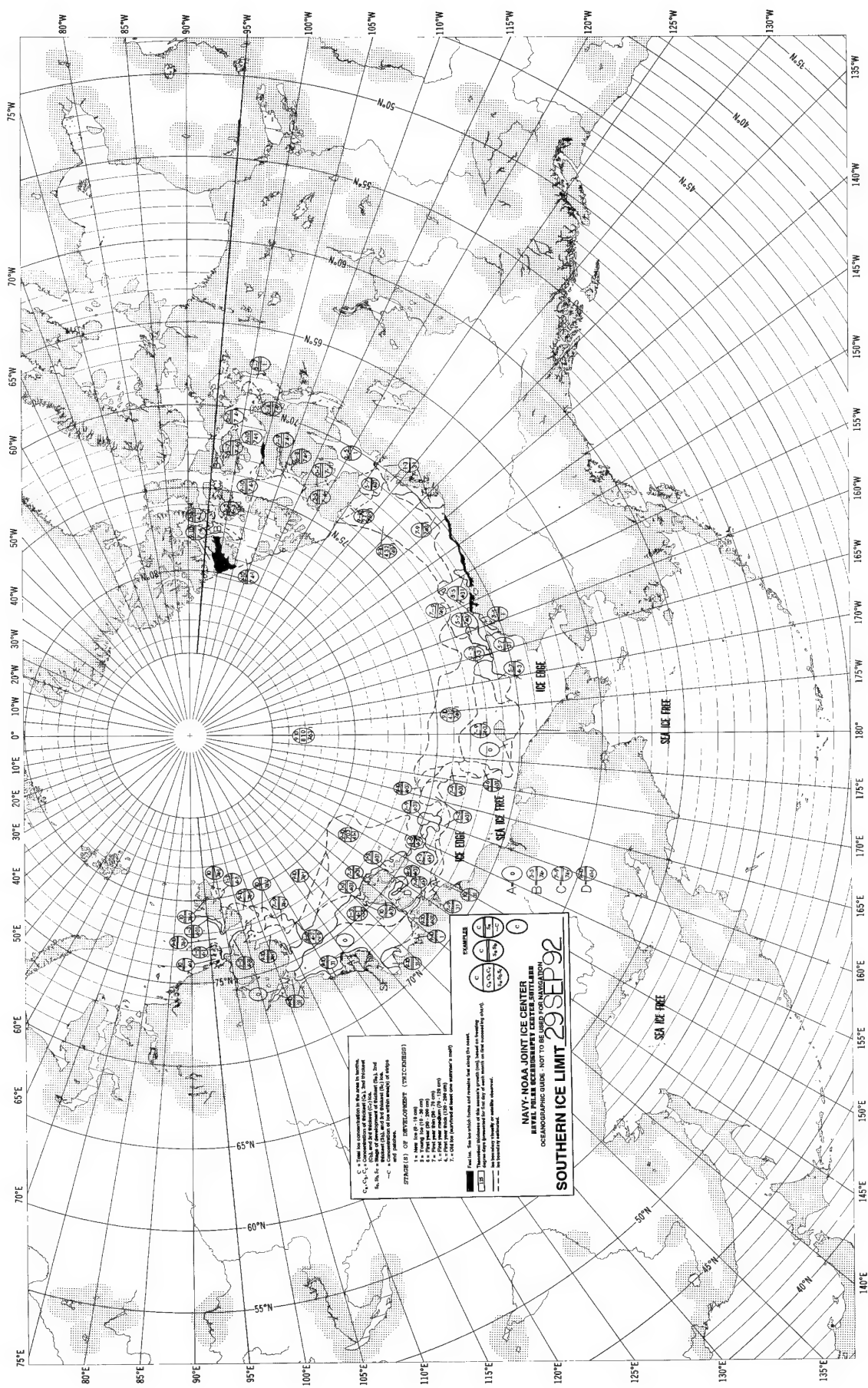


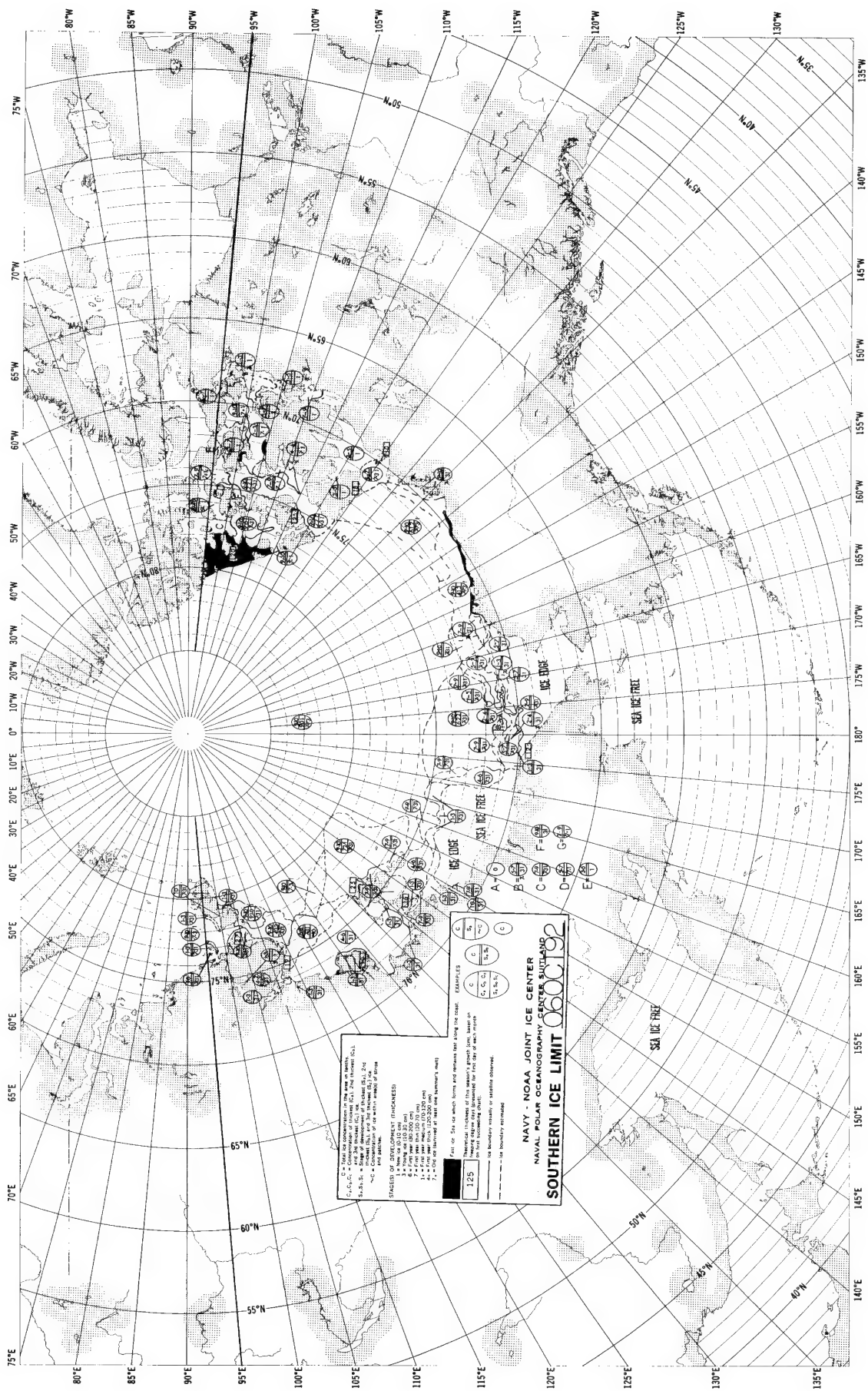


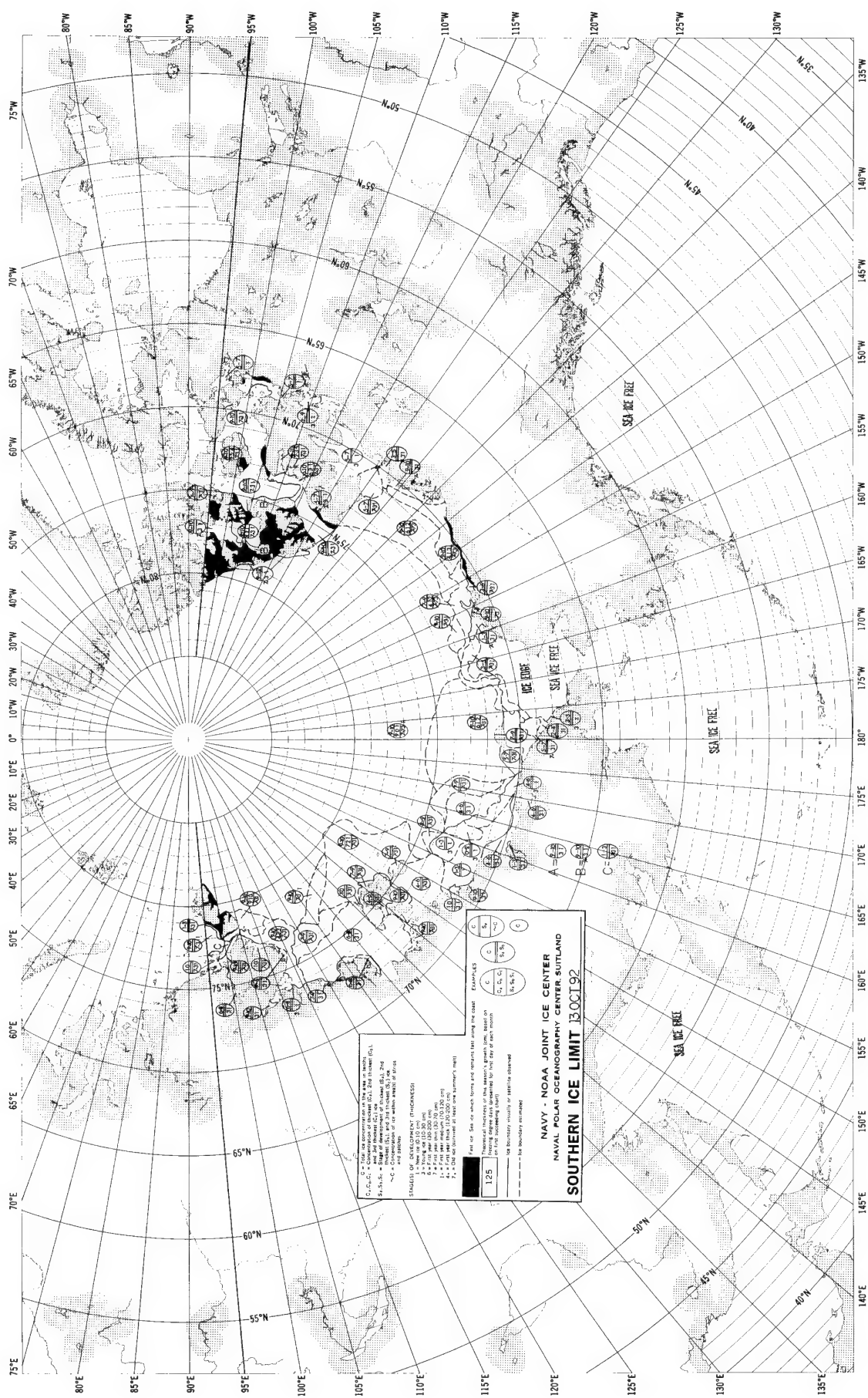


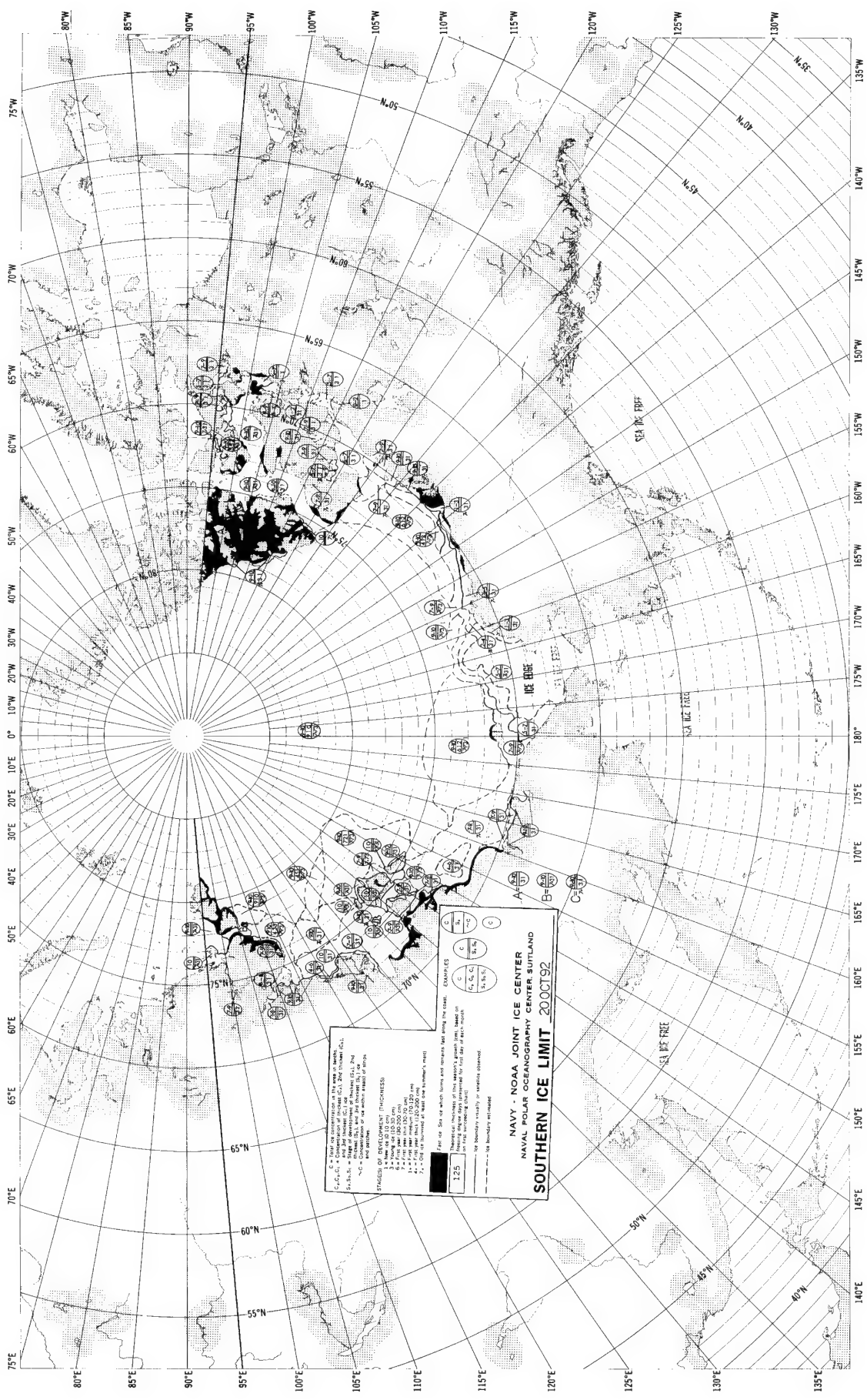


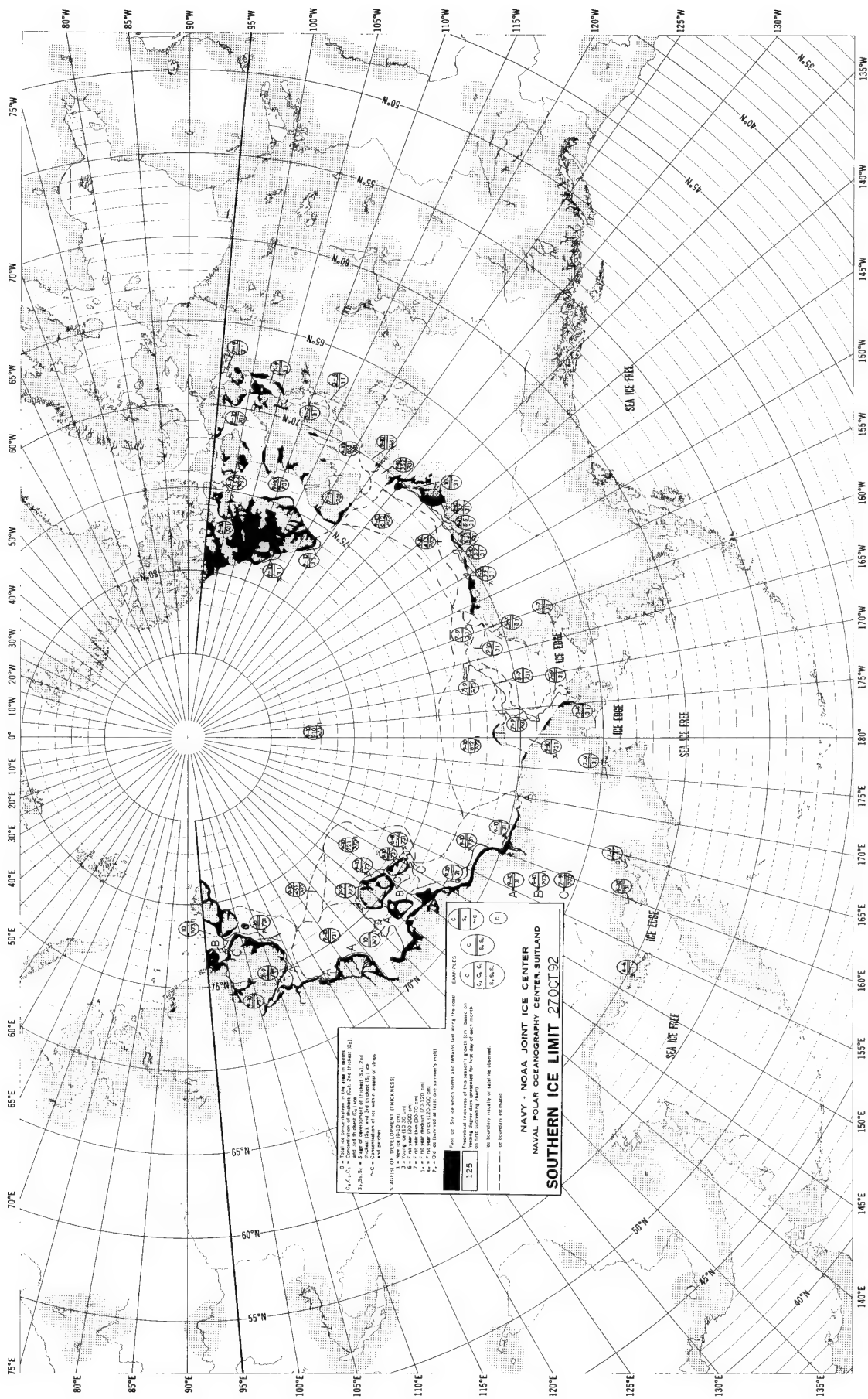


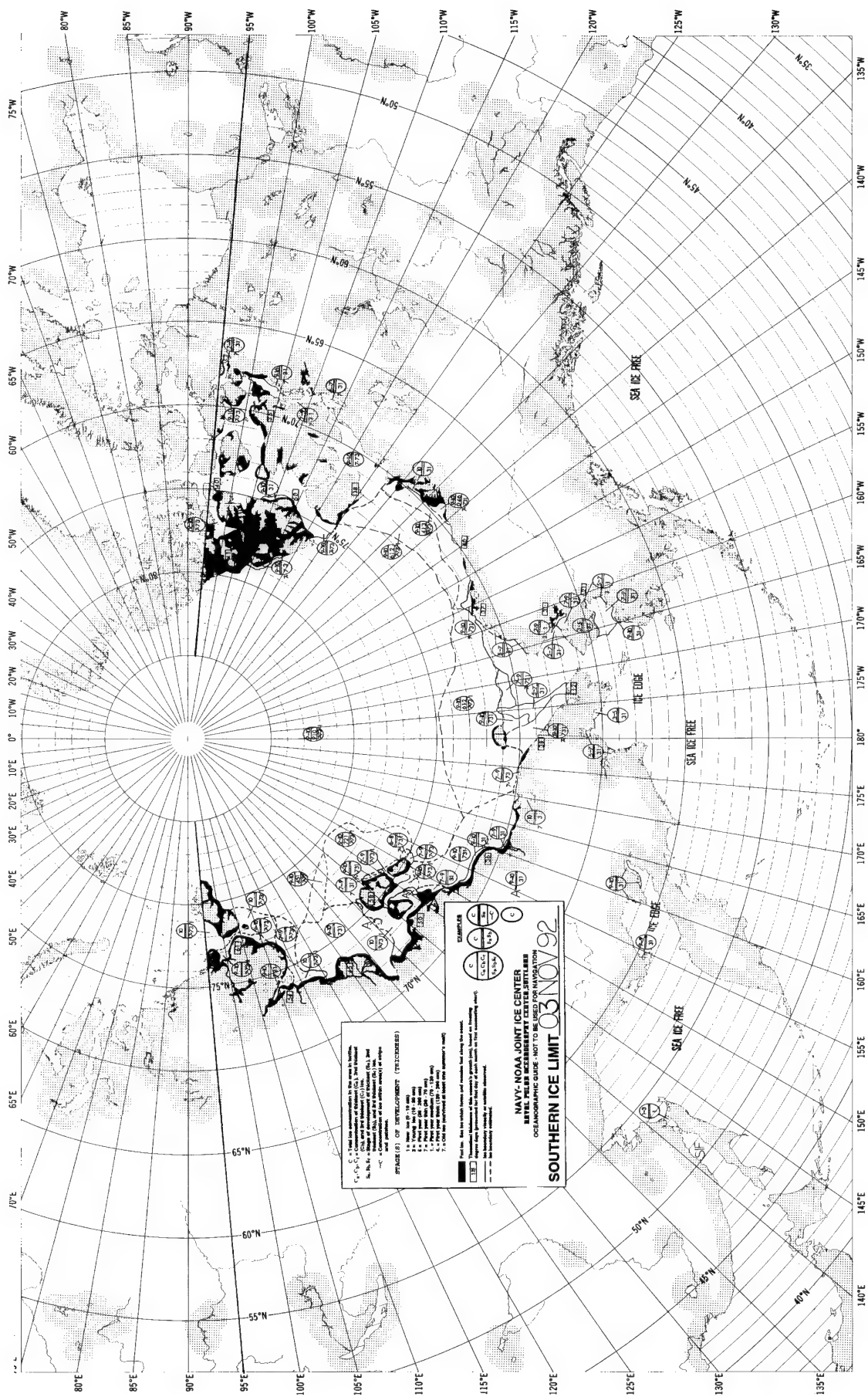


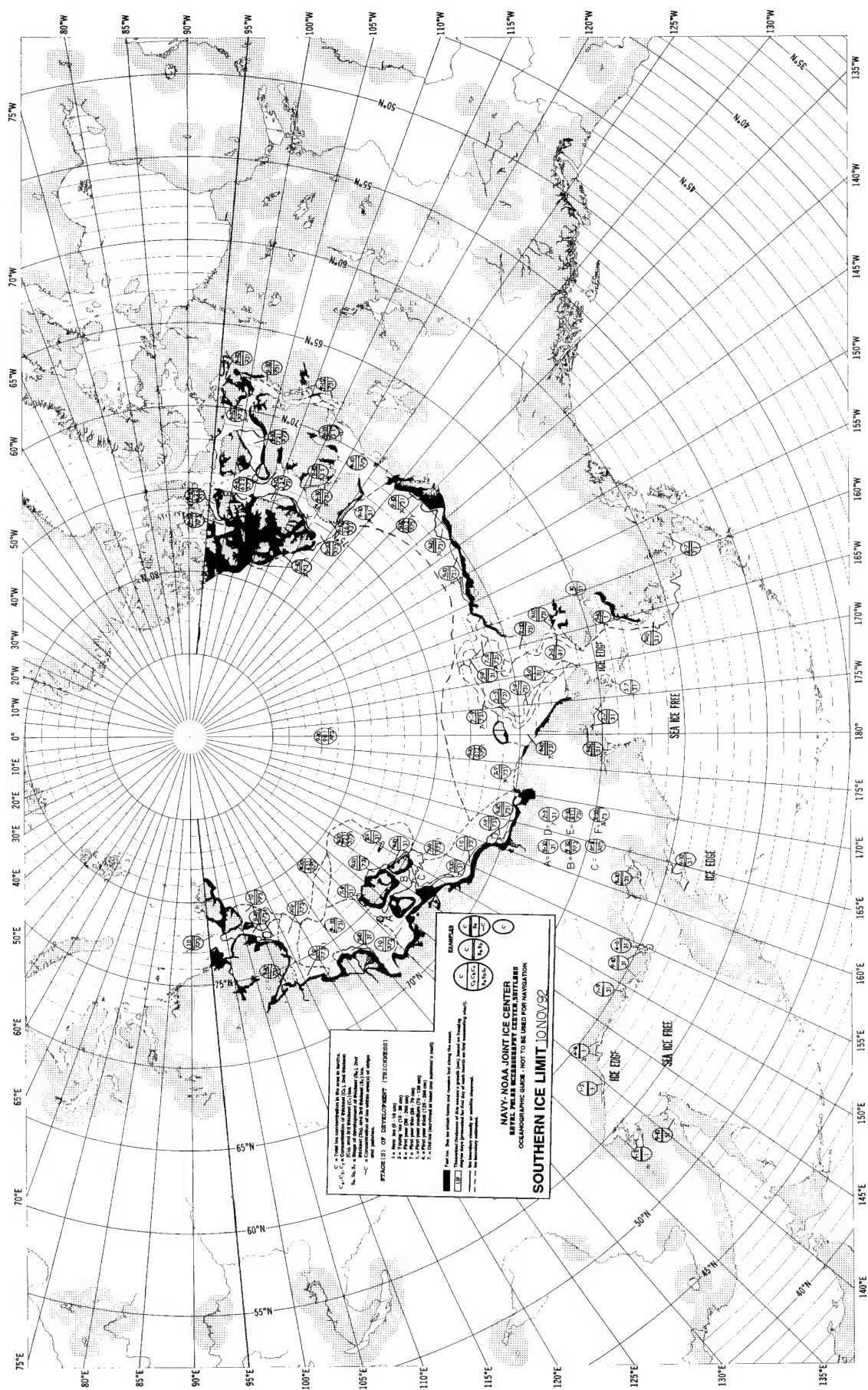


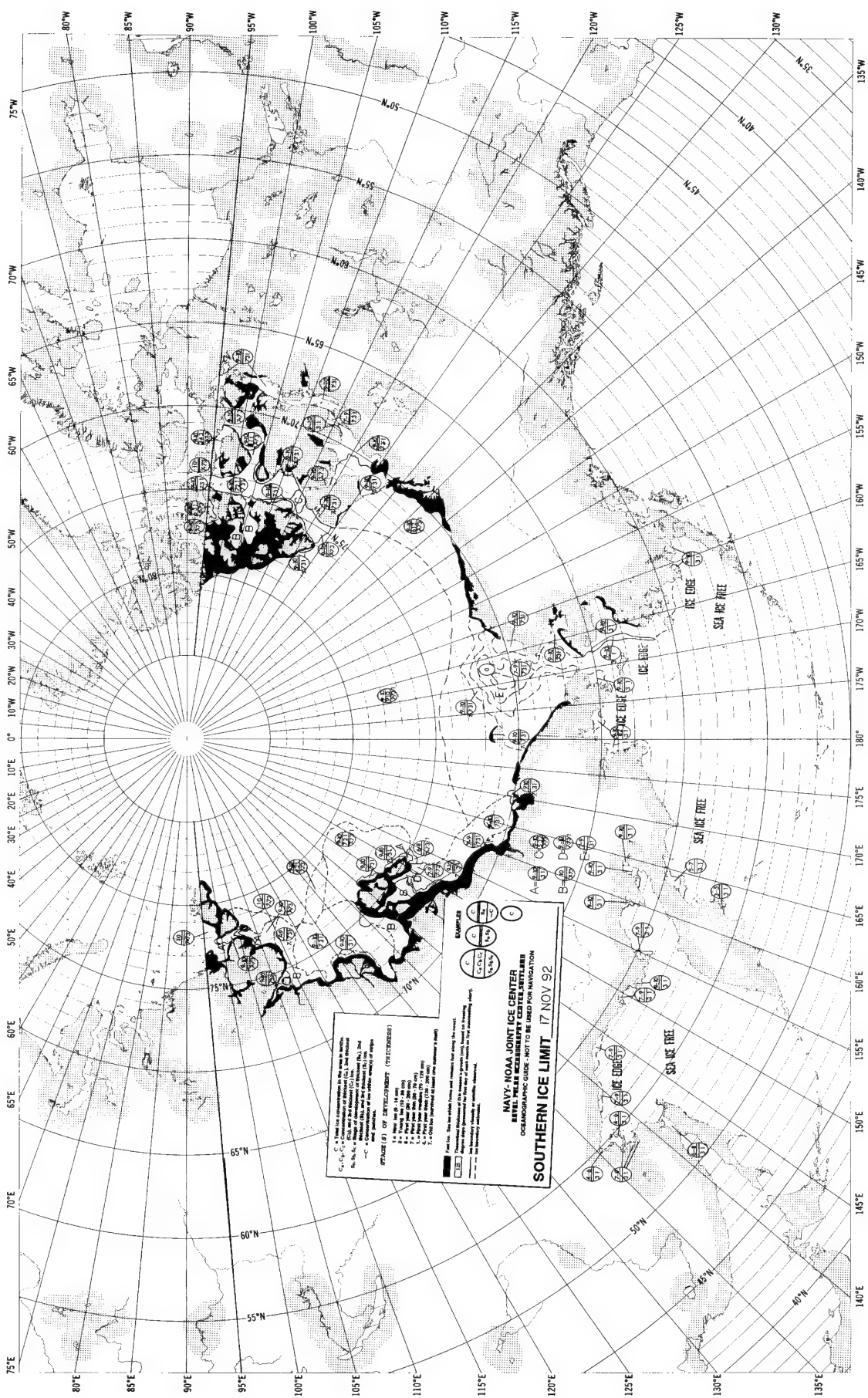


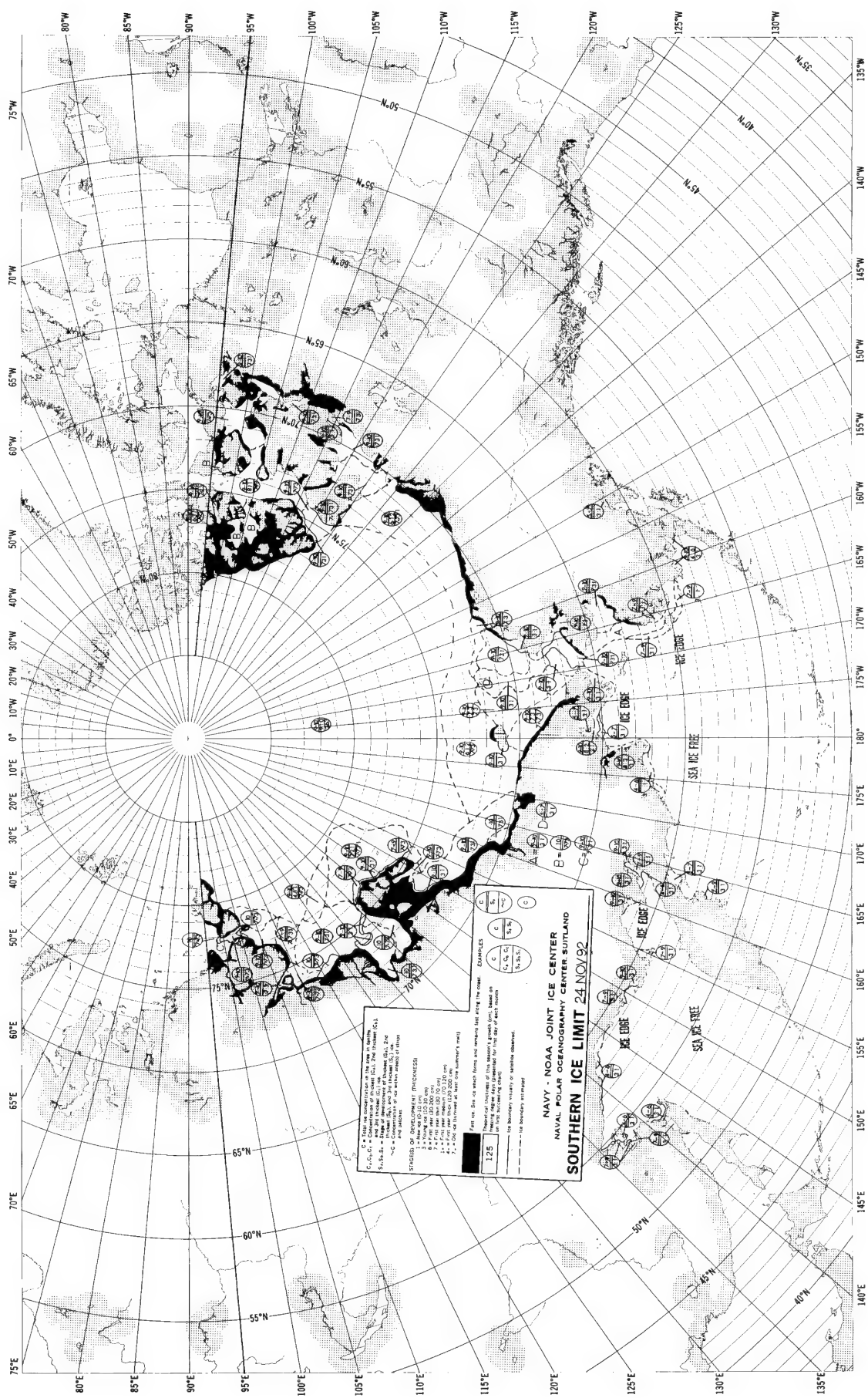


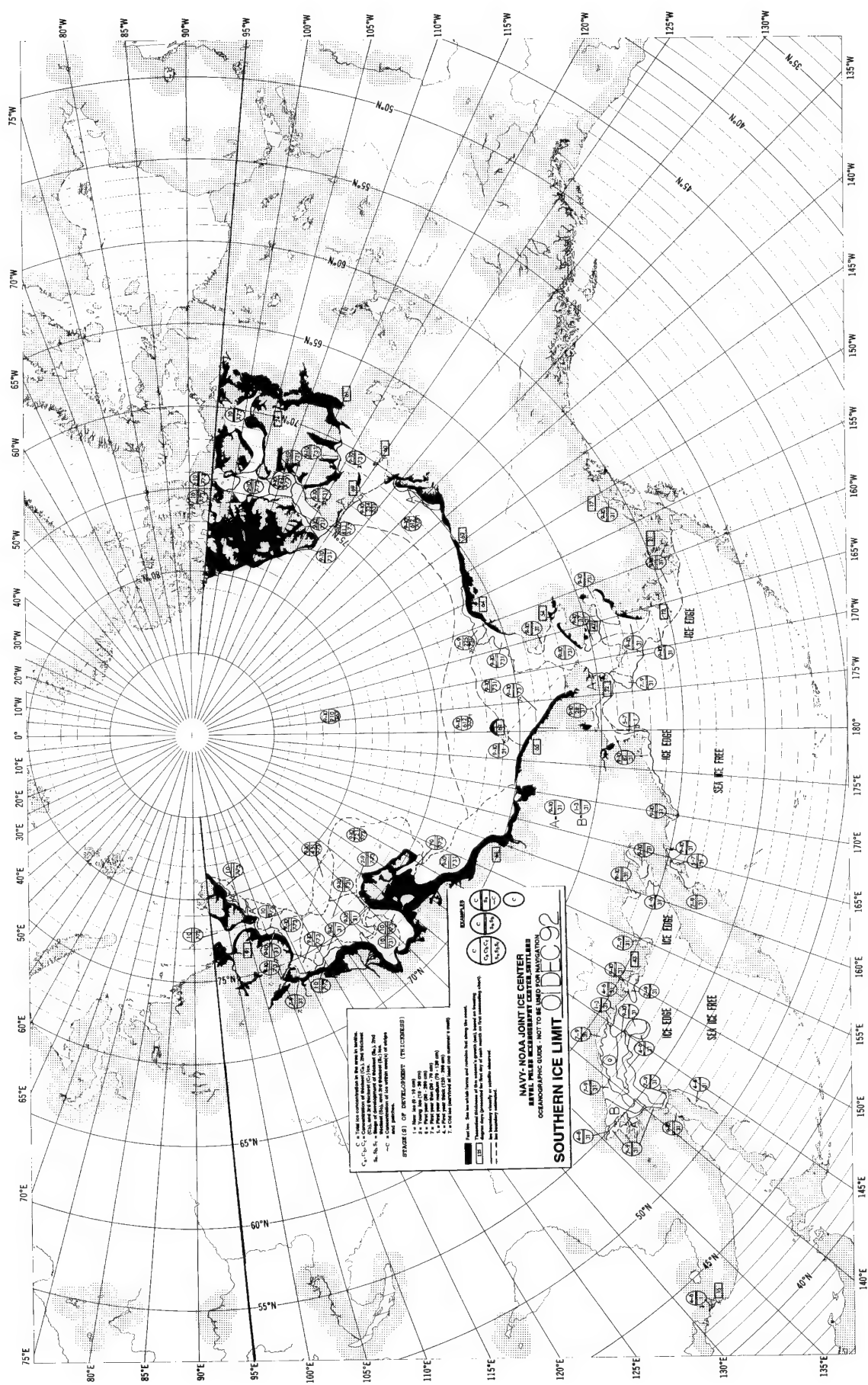


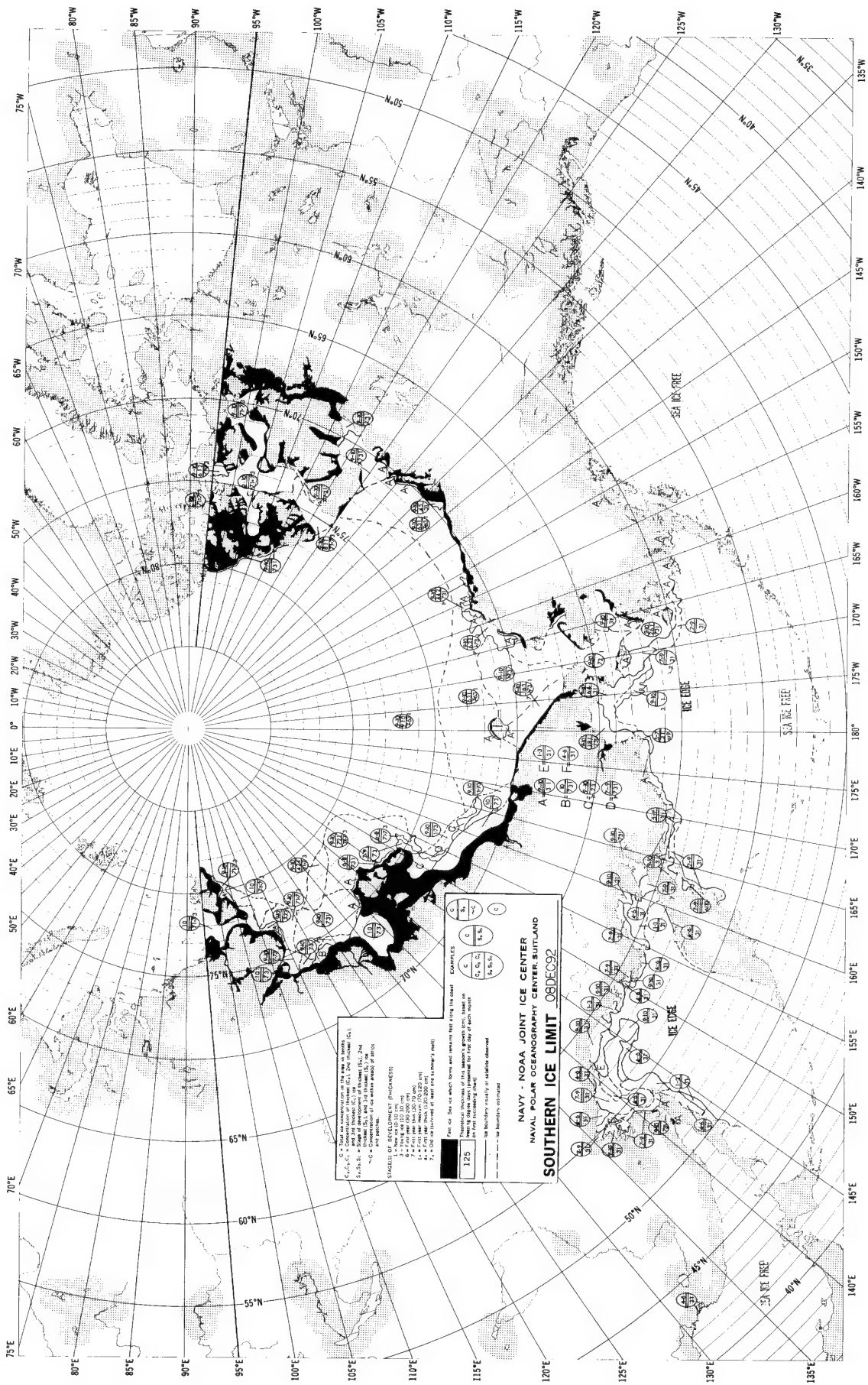


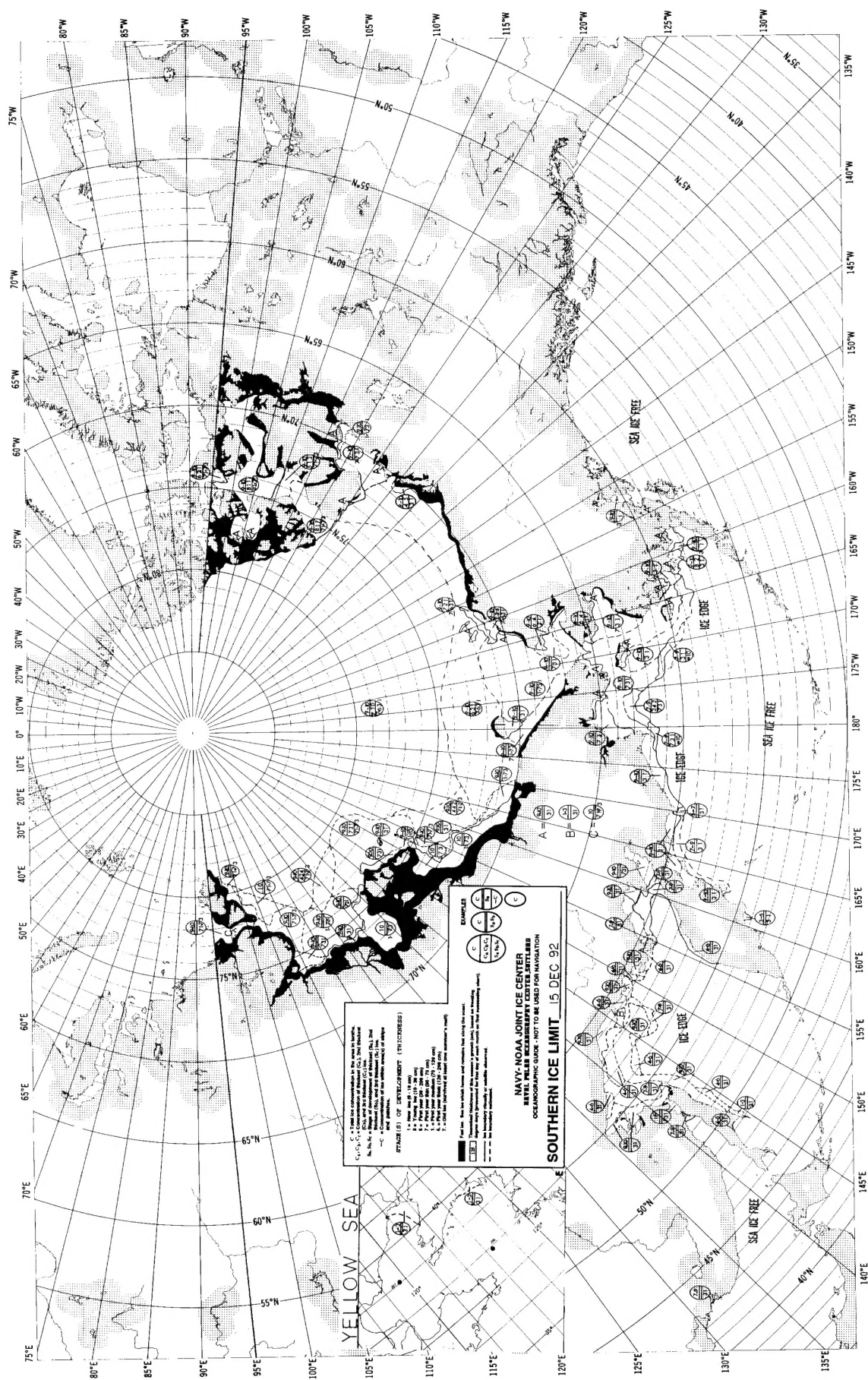


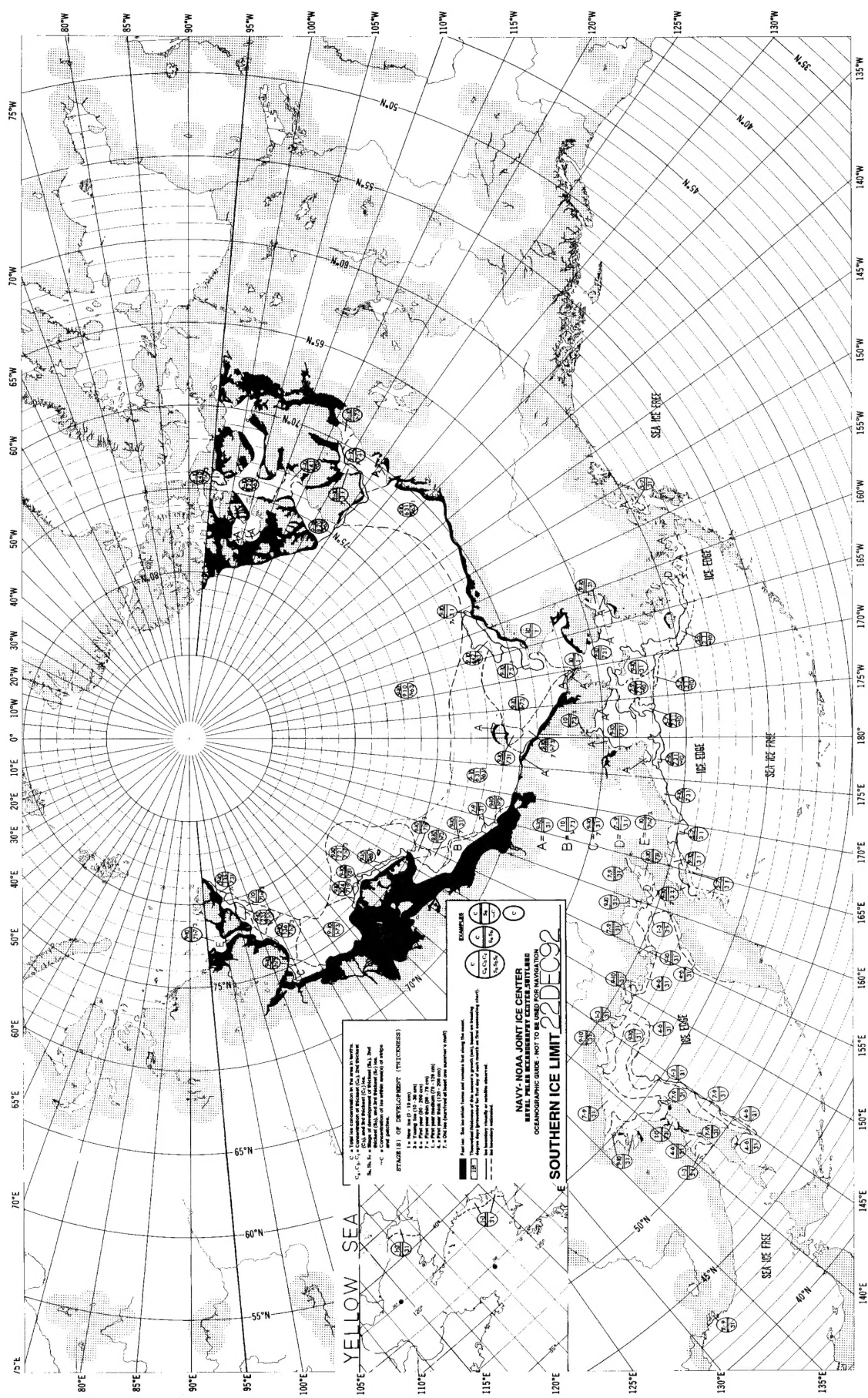












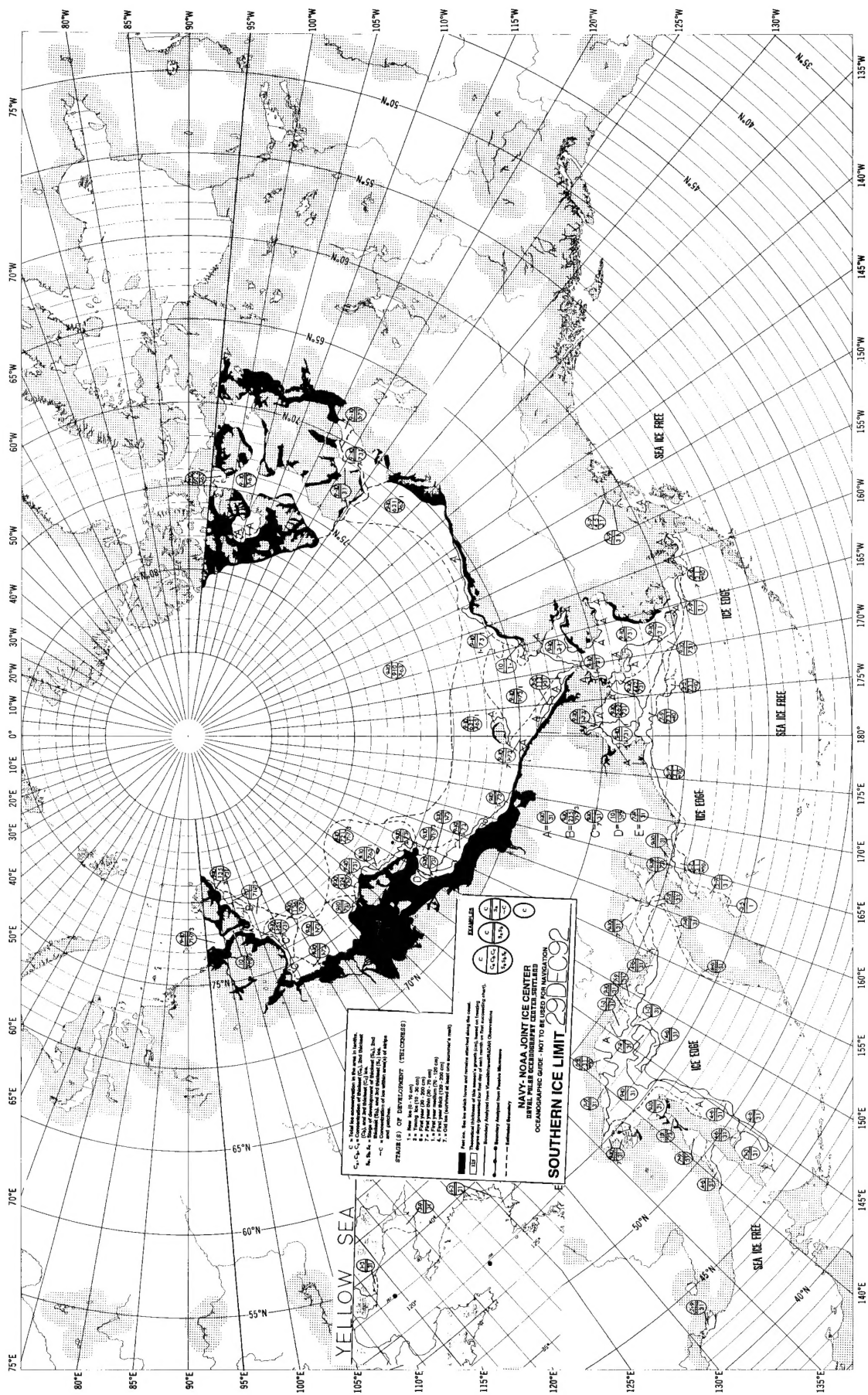


TABLE 1. SATELLITE DATA UTILIZED DURING 1992 (ARCTIC)

Time Period		Satellite Remote Sensing			
From	To	Sensor Platform	Sensor Type	Spectral Region	Resolution Coverage
1-92	12-92	NOAA-10,11,12	AVHRR HRPT/LAC		
			VIS NIR IR	0.58-0.68 um 0.725-1.10 um 10.5-12.5 um	1 km Regional
			GAC VIS IR	0.58-0.68 um 10.5-12.5 um	4 km Global
1-92	12-92	DMSP-F(10/11)	OLS		
			VIS	0.4-1.1 um	0.62 km Regional
			IR	10.2-12.8 um	0.62 km Regional
			SSM/I PMW	1.55 cm (19.35 GHz)	50 km Global
				0.81 cm (37.0 GHz)	25 km Global
3-92	12-92	ERS-1	SAR		
			AMW	C-Band (5.3 GHz)	240 m (FR) Local
					30 m (LR) Local

Abbreviations and Acronyms

AVHRR - Advanced Very High Resolution Radiometer
AMW - Active Microwave
cm - Centimeter
FR - Full Resolution
GAC - Global Area Coverage
GHz - Giga-hertz
HRPT - High Resolution Picture Transmission
IR - Infrared
km - Kilometer
LAC - Local Area Coverage
LR - Low Resolution
NIR - Near Infrared
OLS - Operational Line Scan System
PMW - Passive Microwave
SSM/I - Special Sensor Microwave Imager
um - Micrometer
VIS - Visible